SEPTEMBER, 1949 Vol. 38, No. 7

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

SCHOOL OPENING NUMBER

Photo credit: American Museum of Natural History, New York

THE MYSTERY OF MAN

On the shores of Easter Island, in the far-off South Pacific, there stand a number of mysterious heads, forty, fifty, sixty feet high, carved from stone, with shadowed eyes that have gazed for centuries across the sea toward Polynesia. Who carved these bleak and brooding figures, whence their sculptors came, what the stricken shapes may be trying to say . . . perhaps no one will ever know. Perhaps again the only message is the wonder that aboriginal men possessed the talent and ability to cut these shapes.

But here again is testimony to the claim that talent and ability are possessed, not by one man, not by one race, not by one age, but by all men of all times . . . requiring just the right spark to ignite the flame . . . requiring just the right opportunity and environment to raise the level of performance among all men to heights now reached by only a few.

Certainly if an educator is to be dynamic, hopeful, optimistic, such is the position he must take with respect to the youngsters in his charge. Such must be his creed, his curriculum, his norm. And when he takes this first *big* step, then all other steps must be taken in conformity. There can be no statement that the whole is important and that the parts are not. No saying that a youngster's future is unlimited if his present contradicts it. Ideals cannot be clean if the approach to them is shoddy. No instructor in mechanical drafting, for example, can expect much if the supplies and instruments his students use are cheap, carelessly chosen . . . proof of a vast indifference . . . contradicting all for which true education *really* stands.

EUGENE DIETZGEN CO.

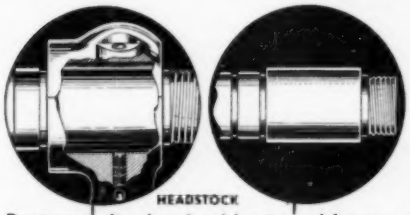
Chicago • New York • San Francisco • New Orleans • Los Angeles
Pittsburgh • Washington • Philadelphia • Milwaukee

Dealers in All Principal Cities

DIETZGEN

EVERYTHING FOR
DRAFTING AND SURVEYING

SOUTH BEND 9" LATHES



HEADSTOCK

Bearings are line bored and bearingized for precision fit. Ample lubrication from oil reservoirs. Spindle is carburized, hardened, and ground; with bearing sufaces super-finished to .000005" rms.

BELT RELEASE

Instant release of belt tension for speed changes. Proper tension of headstock spindle drive belt is easily adjusted.

TAILSTOCK

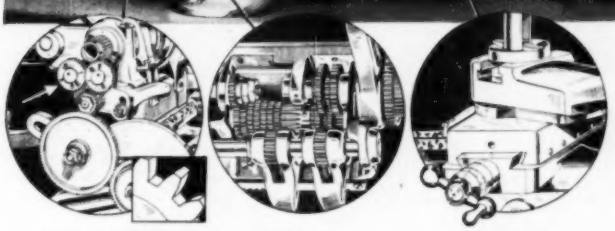
Has set-over for taper turning. Graduated spindle has witness mark for aligning cutter bit. Hardened center self-ejecting.

BED

Three V-ways and one flat-way are hand-scraped entire length for precision alignment of headstock, tailstock, and carriage.

APRON

Has powerful friction clutch and large half-nuts. Safety interlock prevents engaging opposing feeds. All gears machine cut.



REVERSE GEARS

Easily shifted for reversing lead screw rotation and feeds, positive lock. All the gears used in this lathe are machine cut.

GEAR BOX

Screw threads and power feeds selected by shifting two tumblers as indicated on index chart. All gears machine cut steel.

CARRIAGE

V-ways and dovetails hand-scraped. Engine divided micrometer collars on feed screws. Compound Rest base graduated 180 degrees.

Specifications . . .

South Bend 9" Model A Lathe

SWING	over bed — 9-1/4"
	over cross slide — 5"
BED LENGTHS	3, 3-1/2, 4, and 4-1/2 feet
DISTANCE BETWEEN CENTERS	16" to 34"
SPINDLE SPEEDS (12)	41 to 1270 r.p.m.
POWER FEEDS:	
Longitudinal (48)	.0015" to .0853"
Cross-feed (48)	.0004" to .0252"
THREADS (48 pitches)	4 to 224 per inch
MAXIMUM COLLET CAPACITY	1/2 inch
SPINDLE BORE	3/4 inch
TAILSTOCK TOP SET-OVER	5/8 inch

SOUTH BEND LATHE WORKS

466 East Madison Street, South Bend 22, Indiana, U. S. A.

Please send catalog(s) checked:

- ☐ Catalog No. 9 — all models of South Bend 9" Lathes.
- ☐ Catalog No. 100 — all sizes of South Bend Lathes.
- ☐ Catalog No. 400 — South Bend Precision Drill Presses.
- ☐ Catalog No. 500 — 7" Bench Shaper.
- ☐ Catalog No. 77 — Attachments and Accessories.

NAME _____

STREET _____

CITY _____ STATE _____

9" x 3' Model A Bench Lathe, illustrated (Cat. No. 644-Y), with 12-speed horizontal drive, motor, and control — less bench . . **$335.45***

Other South Bend 9" Precision Lathes range in price from $192.45* to $796.45*; depending on model, length of bed, mounting, type of motor drive equipment, etc.

*Prices, f.o.b. factory, include 3 phase, 60 cy., 220-V., motor and control.

SOUTH BEND LATHE WORKS

BUILDING BETTER TOOLS SINCE 1906

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, September, 1949, Volume 38, No. 7. Published monthly, except July and August, by The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis. Entered as Second-Class Matter January 2, 1914, at the Post Office at Milwaukee 1, Wis., under the act of March 3, 1879. Subscription price in the U. S., Canada, and countries of the Pan-American Union, $3.00 per year; Foreign, $3.50; Single copies, 35 cents.

■ SOUND POLICIES

■ IMPROVED FACILITIES

■ NEW DESIGNS

■ MAXIMUM VALUES

walker-Turner

KEARNEY & TRECKER CORP.
PLAINFIELD, N. J.
U. S. A.

NEW CATALOG

The first of several new catalogs in process is now ready for distribution, write now for your free copy . . . All the latest models are fully described, the complete Walker-Turner line is illustrated. A post card will bring your copy by return mail, or ask your dealer for a copy. *Walker-Turner Machine Tools are sold only through Authorized Dealers.*

KEARNEY & TRECKER MILWAUKEE

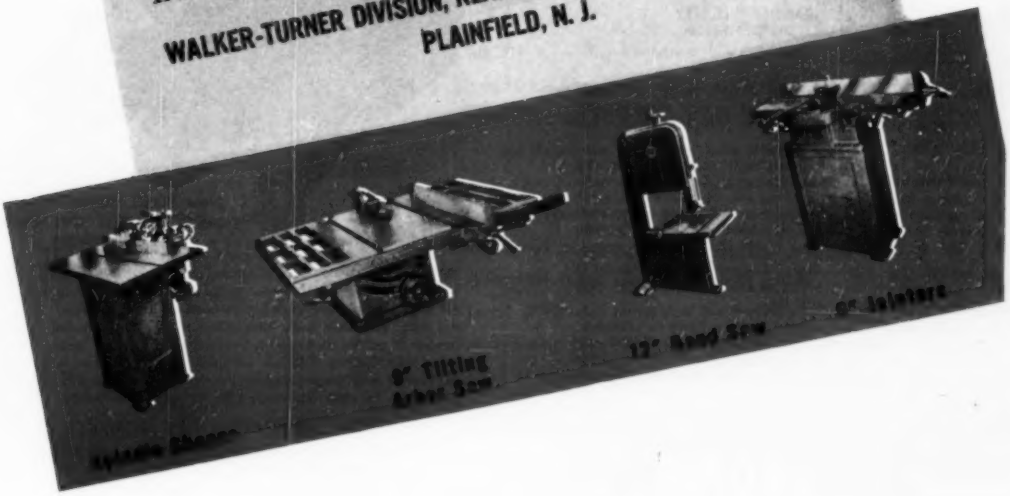
walker-Turner

51 YEARS OF LEADERSHIP PIONEERING IN PRECISION MILLING MACHINES • BORING MACHINES AND SPECIAL EQUIPMENT...

28 YEARS OF LEADERSHIP IN LIGHT MACHINE TOOLS VOLUME PRODUCTION • HIGH QUALITY AND POPULAR PRICES...

Combining the experience of two pioneer organizations and their affiliated research, manufacturing facilities and know how—the Walker-Turner Division at Plainfield, N. J. is now supplying light machine tools of ever-increasing standards of performance, long life, and trouble free operation.

WALKER-TURNER DIVISION, KEARNEY & TRECKER CORPORATION
PLAINFIELD, N. J.

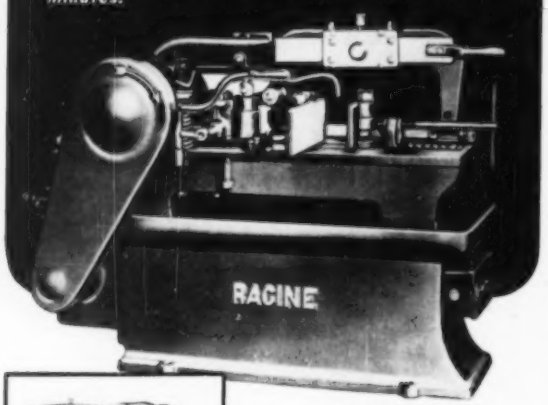


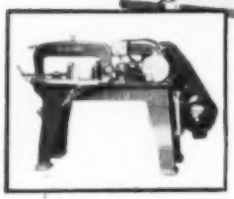
RADIAL SAWS • BAND SAWS • DRILL PRESSES • TILTING ARBOR SAWS • JIG SAWS • TABLE SAWS • JOINTERS • LATHES • BELT AND DISC SURFACERS

A RACINE "UTILITY"

MAKES METAL CUTTING SIMPLE and EASY

A 15 year old student can learn to efficiently operate a Racine "Utility" in less than 30 minutes.





RACINE "UTILITY"
Wet Cut Model

RACINE "UTILITY"
Dry Cut Model

Racine "Utilities" are used in today's large and small industries as an auxiliary saw for all-around metal cutting work. They are the ideal saws for training students between school and job.

Capacity 6" x 6", these saws will accurately cut any metal from soft aluminum tubing to hard alloy steels. Both the pressure and feed of the saw blade are controlled hydraulically. All moving parts are guarded to prevent accidents — most important in school training equipment.

"Utility" Wet Cut Model is provided with a base containing reservoir for coolant. "Utility" Dry Cut Model is the same as "wet cut" model in every detail except base consists of four sturdy iron legs.

Larger Racine Hydraulic Metal Cutting Saws in capacities of 6" x 6" to 20" x 20" are also available. WRITE for complete metal saw line catalog No. 70-C. Address RACINE TOOL & MACHINE CO., 1780 State St., Racine, Wisconsin.

RACINE
TOOL & MACHINE CO.
RACINE, WISCONSIN

STANDARD FOR QUALITY AND PRECISION

A Suggestion FOR A LESSON

Stress the fact that well-paid mechanics, like progressive Doctors and Dentists, must keep pace with the latest methods and tools that are constantly being developed to make their work more efficient. For example—

THE NEW LUFKIN SMALL HOLE GAGE

has simplified the troublesome problem of measuring small holes and slots.

Simply insert ball end in hole—turn knurled knob until right feel is obtained—then measure ball end with Micrometer. Gages have ball ends flattened off close to center line which permits gaging shallow holes or grooves. Provision is also made whereby travel of the expanding cone is stopped at both the extreme open and closed limits of the gage, preventing breakage. Available individually in four different sizes or as a complete set with range of ⅛ to ½ inch. Write for free catalog.

★ **SEND FOR THIS BOOKLET!**

Send for this interesting and educational 5-color picture story book. Enclose 10c (no stamps) to cover handling and mailing costs. Write Dept. IA

THE LUFKIN RULE COMPANY
PRECISION TOOLS · TAPES · RULES
Saginaw, Michigan

ARMSTRONG

New TOOL HOLDERS MAKE MORE PROFIT ON EVERY OPERATION

With ARMSTRONG TOOL HOLDERS you can take advantage of the new high speeds and heavier feeds of the newer cutting materials, without revolutionary changes or costly experimentation. They are the most profitable tools obtainable; the lowest in initial cost, the longest in service and most economical in use, for all incorporate the basic ARMSTRONG Principle of small interchangeable cutter-bits in permanent drop forged shanks. They are the most readily obtainable tools, too, for they are stocked by all leading distributors.

WRITE FOR CIRCULARS DESCRIBING

(1) ARMSTRONG Carbide TOOL HOLDERS and ARMIDE (Carbide Tipped) Cutters.

(2) ARMSTRONG C A TOOL HOLDERS and ARMALOY (Cast Alloy) Cutter-bits.

Write for NEW S-48 Catalog just released.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
5222 W. ARMSTRONG AVE. CHICAGO, 30 U.S.A.
New York • San Francisco

Good News for School Shop Budgets

AMMCO model 2600 and 1600 Combination for Wet Honing

Costs less to BUY...and Costs less to MAINTAIN

$298.50

ONE *Permanent type* HONING HEAD handles 90% of all jobs within range!

Here's a really versatile combination set-up to meet all needs for shop training in both *wet* and *dry* honing. Best of all, it's the only honing machine that can handle all sizes within its range with *only one honing head* . . . And you'll find your stone replacement cost at least 50% less. Model 1600 Coolant Unit is portable and can be used with other machines in your shop. Mail the coupon below to get full information on the economical AMMCO honing combination. We'll also send you the name of your nearest AMMCO distributor who will be glad to arrange a demonstration in your shop at no charge or obligation.

Perfect for School Shops... the AMMCO 7" SHAPER

A "precision machine of a thousand uses" . . . regular industrial model, featuring simplicity of operation, ease of set-up, precision results. Check coupon for complete details.

AMMCO

AMMCO TOOLS, INC., 2100 Commonwealth Avenue, North Chicago, Ill.

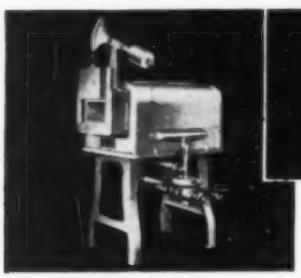
- ☐ Send information on Combination 2600-1600
- ☐ Send information on AMMCO 7" Shaper
- ☐ Send free copy of the AMMCO Tool Catalog

NAME_____

POSITION_____ SCHOOL_____

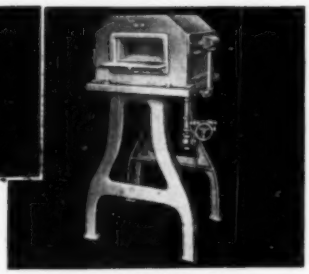
CITY_____ ZONE____ STATE_____

Train with Snap-on Tools
. . . the tools used throughout industry
Train your students *right* — train them with the tools they'll actually use on the job. Better mechanics of the automotive industry, the aircraft industry and scores of major industrial plants throughout the country prefer to work with Snap-on tools. Let your students get the "feel" of the fine tools they will later work with — develop respect and appreciation for the better, faster workmanship they deliver.
SNAP-ON TOOLS CORPORATION
KENOSHA, WISCONSIN
8074-I 28th AVENUE
Snap-on Tools
THE CHOICE OF BETTER MECHANICS



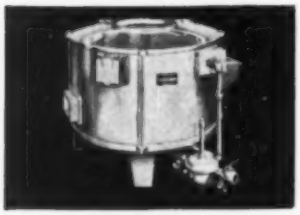
Small Semi-Muffle Oven

Sunbeam STEWART
THE BEST INDUSTRIAL FURNACES MADE



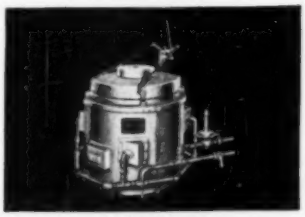
Small Forge

HUNDREDS OF THESE SUNBEAM STEWART FURNACES ARE IN THE VOCATIONAL DEPARTMENTS OF TECHNICAL SCHOOLS



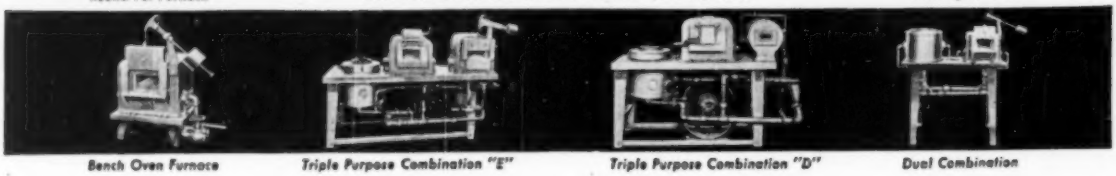
Round Pot Furnace

Because Sunbeam Stewart units have been designed for efficient production heat treating in small shops and tool rooms, they are widely recognized as standard equipment for all types of industrial heat treating and vocational training work. For student instruction and reference write for our free "Guide to Furnace Selection." Aids in determining the type of furnace best suited for any work. Also ask for the new Data File on school units.



Melting Furnace

SUNBEAM STEWART INDUSTRIAL FURNACE DIVISION OF SUNBEAM CORPORATION (Formerly CHICAGO FLEXIBLE SHAFT CO.)
Main Office: 4433 Ogden Ave., Dept. 114, Chicago 23, Ill.
New York Office: 322 W. 48th St., New York 19, N. Y.



Bench Oven Furnace | Triple Purpose Combination "E" | Triple Purpose Combination "D" | Dual Combination

The Ideal Training Lathe

Equipped With
8-SPEED GEARED HEAD

•

Medium-Priced . . . Simple Design . . . Extra-Sturdy Construction

LOW MAINTENANCE COST!

Students trained on the modern "King-made" Sebastian Lathe are *fully* trained — equipped to run any size engine lathe, large or small.

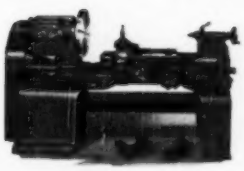
The medium-priced Sebastian, widely used throughout industry, has a great many outstanding construction and operating features. Among standard features are: 8-speed geared head . . . Timken Bearings on all headstock shafts . . . Reverse in apron for feeds . . . 57 feed and thread changes . . . Control handle on apron for longitudinal friction feed . . . Travel safety on compound . . . Apron control for start, stop, and reverse of spindle (standard on lathes with beds 10′ and longer; also available on other bed sizes).

An unusually large number of accessories are supplied as regular equipment, *included in the basic lathe price.*

Before deciding on any lathe it will pay you to thoroughly investigate the modern Sebastian. Ask your nearest Sebastian dealer or write us direct for Catalog S-1 (Standard Lathes) and S-101 (Special Lathes — Gap, Clutch & Brake, etc.)

Sebastian GEARED HEAD LATHES

MANUFACTURED BY KING BUILDERS OF WORLD-RENOWNED "KING" BORING & TURNING MACHINES



GAP LATHES
Made in 16" and 20" sizes

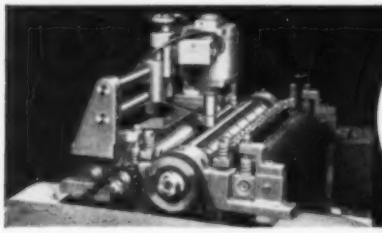
All Sebastian Lathes are equipped with 8-Speed Geared Heads

American Steel Foundries

KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of Vertical Boring & Turning Machines and Sebastian Lathes



FOR TEACHING
Standard Planing Practice
HERE IS, by long odds, your Best Bet!

BUSS NO. 208 WOOD PLANER

CAPACITY 20" x 8"

It is the only planer in the low-cost field that is adjusted and operated similarly to the large standard machines used in industry . . . the only planer in this class that is equipped with a sectional infeed roll, sectional Chipbreaker, four driven rolls, in-built knife grinder and other big planer features. The grinder permits the instructor to grind the knives in just a few minutes. It saves a great deal of his time and tends to eliminate the dull knife condition which so frequently prevents the student from doing good work. Engineered for maximum protection, the No. 208, judged from any angle, is the best possible selection for teaching standard wood planing practice in the school shop. And the price is well within the means of the average school budget. Write for the complete facts.

BUSS
MACHINE WORKS
246 Eighth St., HOLLAND, MICHIGAN

"ONE OF THE BEST MACHINES WE HAVE FOR TRAINING PURPOSES"
Samuel Gompers Trades School, San Francisco

"Our Foley Saw Filer has been in constant operation for the last two years on circular saws, band saws and hand saws. Every Trades School or High School should have one." — D. H. Davis, Instructor, Samuel Gompers Trades School. The Foley Automatic Saw Filer is the ONLY machine that files and joints all hand, back and mitre box saws from 3 to 16 points per inch, crosscut circular saws up to 16" diameter (24" optional), and band saws up to 24 feet long. Foley filed saws cut faster, truer, cleaner — stay sharp longer and last longer.

30-DAY TRIAL OFFER
You may have the privilege of using the Foley Saw Filer in your own shop for 30 days. Write or send coupon for details and list of school users.

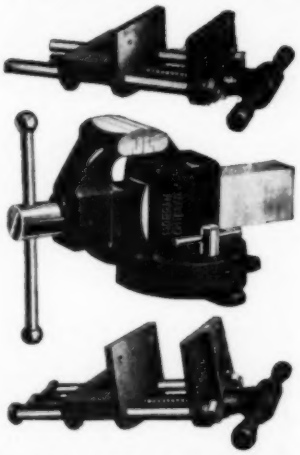
FOLEY *Automatic* SAW FILER

FOLEY MFG. CO., 3318 N.E. 5th St., Minneapolis 18, Minn.
Please send full information on 30-Day Trial Offer and list of school users of Foley Saw Filers.

Name .....
Address .....
School .....

MORGAN
VISES
SAFE • STRONG

A new low cost woodworking vise — ideal for school-shop use. Made of best materials, light in weight, yet sturdy in construction.

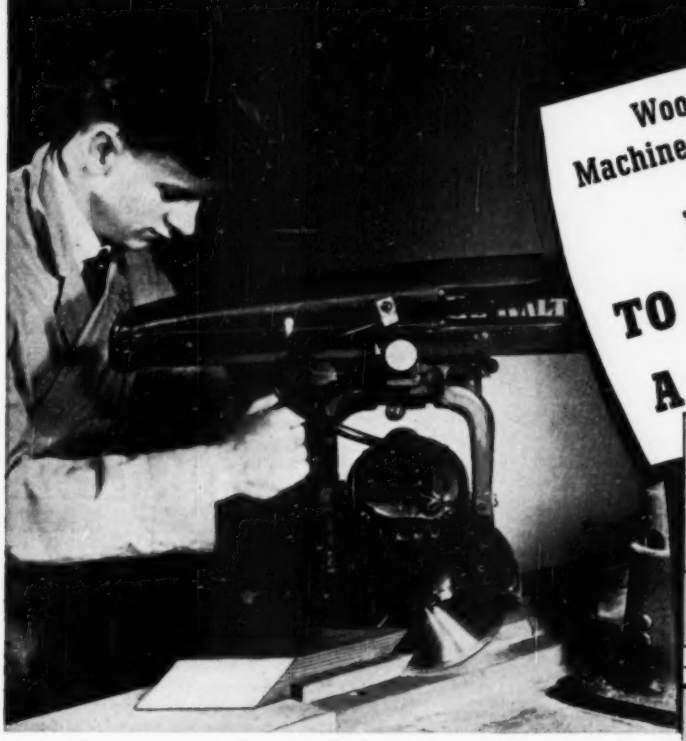


MACHINIST VISE
Unsurpassed for Strength and durability. Supplied with stationary or swivel base and in various sizes.

CONTINUOUS SCREW AND QUICK ACTION VISE
Designed and built to withstand the most severe service. The extra heavy Cold Rolled Screw and Solid Bronze Nut will last a lifetime.

MORGAN VISE COMPANY
120 N. Jefferson Street Chicago 6, Illinois

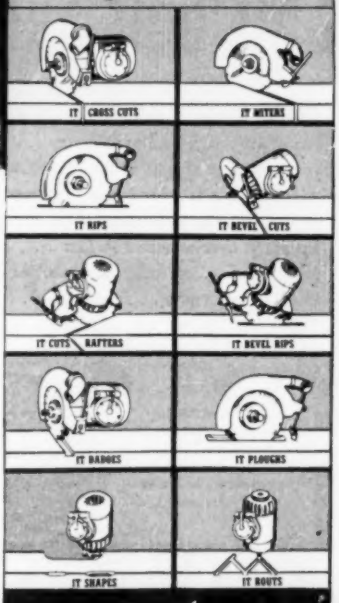
Make this a required course . . . and your wood-shop training is complete!



Wood Shop Machine Course No. 1

HOW TO OPERATE A DE WALT

DE WALT is a complete shop in itself



...and with proper tools makes any cut possible!

After the student has completed his basic training course in the use o hand tools, he should have a required course in the operation of DeWalt.

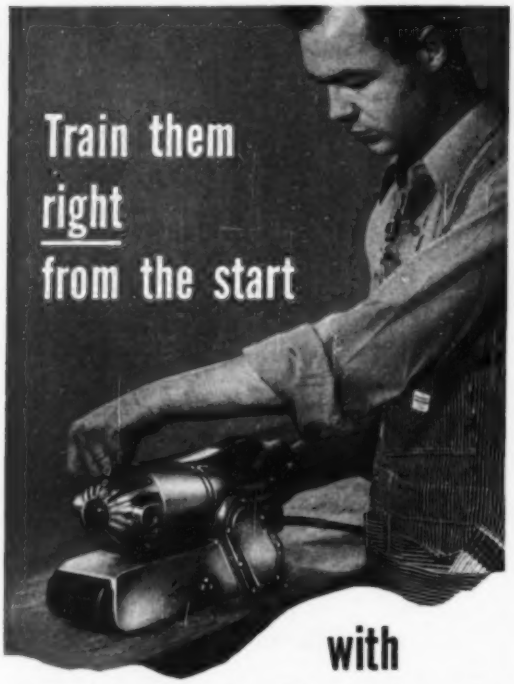
Knowing how to make the fullest use of this flexible, easy-to-operate machine, will give any student a head-start as he prepares for tomorrow's industry.

When he leaves school he will be fully acquainted with a machine that is destined to occupy a prominent place in tomorrow's industry. The perfection of the DeWalt saw has created new methods in cutting wood, making obsolete old-style equipment previously used.

Ask a nearby DeWalt dealer about two DeWalt 16MM movies—one showing the general application of DeWalt—the other showing modern, pre-cutting techniques developed during the war. Write for catalog.

DE WALT, INC.

79 Fountain Avenue Lancaster, Penna.



with

SKIL Belt Sander!

You give students a head start to finer finishing . . . and send them out ready for work in any industry . . . when you teach them with SKIL Belt Sander.

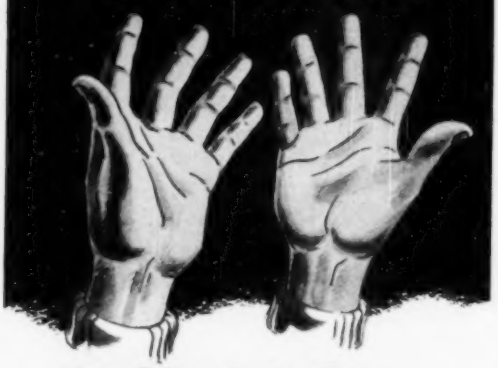
SKIL Belt Sander is light and easy to use. It's the popular choice of men in industry everywhere for fast . . . better sanding . . . on all materials. And it's built to cut costs . . . save time . . . and stand up longer on countless sanding operations.

SKILSAW, INC.
5033 Elston Ave., Chicago 30, Ill.
Factory Branches in Principal Cities
In Canada: SKILTOOLS, LTD.
66 Portland St., Toronto, Ont.

SKIL ELECTRIC Tools PNEUMATIC
TRADE MARK

Get SKIL Belt Sander Today!

Put the Right Tools In the Hands of America's Youth



Teaching Is Easier — Training Faster —

with ATKINS "Silver Steel" SAWS

Students learn faster with the right saws! Hundreds of schools have proved that the right saws are identified by the ATKINS "Silver Steel" Trade Mark! . . . Every Atkins is scientifically designed — expertly made — to cut fast and true — to give the novice the feel and balance essential to fine craftsmanship.

Because it has been proved that ATKINS Saws stay on the job longer in classroom use — that they retain peak efficiency with the minimum of servicing — that they cut costs, increase classroom morale and lower classroom fatigue . . . because Atkins Saws have proved more economical — they are *the* saws best suited to *your* classroom needs!

There's an ATKINS for Every Classroom Use...

You Just Cannot Get Finer Saw Steel than ATKINS "Silver Steel"

AAA ATKINS

E. C. ATKINS AND COMPANY
Home Office and Factory:
402 S. Illinois Street, Indianapolis 9, Indiana
Branch Factory: Portland, Oregon
Branch Offices:
Atlanta • Chicago • Los Angeles • New Orleans • New York • San Francisco

MAKERS OF BETTER SAWS FOR EVERY CUTTING JOB

ONE KIT DOES THREE JOBS!

$126.50 COMPLETE (As Illustrated)

1 **DRIVES and REMOVES** nuts, bolts, cap screws up to ⅜" thread size. Hammers frozen, stubborn fastenings loose with thousands of powerful blows per minute.

2 **DRILLS** holes in a jiffy up to ½" diameter in steel.

3 **TAPS** holes with thread sizes from No. 10-32 to ½"-13.

SCREWDRIVING and STUD REMOVING attachments available at slight extra cost. The ideal Kit for maintenance and repair work!

NEW!

Black & Decker ⅜" Electric IMPACT WRENCH KIT

Includes powerful, lightweight Black & Decker ⅜" Electric Impact Wrench, with ½" square drive shank • Chuck for Drilling and Tapping, complete with open-end wrench and hex-key • 6 Hexagon sockets, sizes from ⅛" to ⅝" across flats • Sturdy convenient all-steel carrying Kit.

Here's one of the handiest, most versatile Kits you've ever seen! Enables you to carry complete equipment to the work for a wide variety of repair and maintenance jobs! Ask your nearby B & D Distributor for a free demonstration of how it will speed up your work. Write for detailed catalog to: THE BLACK & DECKER MFG. CO., 680 Pennsylvania Ave., Towson 4, Maryland.

LEADING DISTRIBUTORS EVERYWHERE SELL

ELECTRIC DRILLS
BENCH GRINDERS
ELECTRIC SANDERS
PORTABLE GRINDERS

Black & Decker
PORTABLE ELECTRIC TOOLS

MORE POWERFUL STANLEY-CARTER RS8 ROUTER-SHAPER

More power, mechanical improvements, versatility, ease of handling . . . more of everything for your money in this latest addition to the Stanley-Carter line.

MORE POWER New ½ h.p., heavy-duty motor, wound and insulated to withstand severe mechanical shock and vibration. Operates on D.C. or A.C., 60 cycles or less.

MECHANICAL IMPROVEMENTS Separate, dust-tight housing for switch connections. New ventilating system provides powerful air blast to cool motor and keep work surface clean. Air is taken in below brushes and connections so that dirt is kept away from these parts. Oversize ball bearings, sealed and lubricated for life. No oiling. Brush caps protected by cast rim.

PLUS OTHER POPULAR STANLEY-CARTER FEATURES Simple, accurate depth of cut adjustment just by turning accurately threaded motor casing. Recessed switch to prevent accidental flipping of switch. Non-slipping, carefully ground collet type chuck. Write for literature. Stanley Electric Tools, Stanley-Carter Sales Dept., 536 Myrtle St., New Britain, Connecticut.

STANLEY

Reg. U. S. Pat. Off.

HARDWARE • HAND TOOLS • ELECTRIC TOOLS • STEEL STRAPPING

A PRECISION GROOVER THAT DOES A REAL JOB

Ask for No. 606 DADO SAW

This saw will cut smooth grooves, mortises and rabbitted joints that require little or no sanding for fitting and gluing.

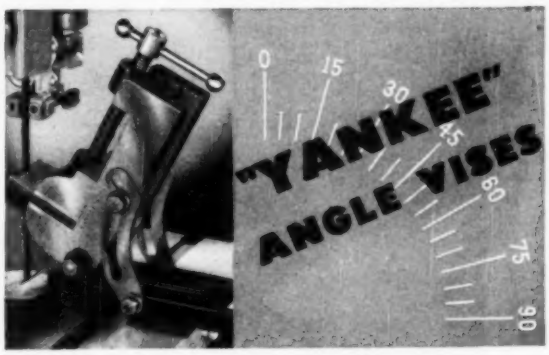
Outside cutters are carefully bevel filed. Inside cutters are swaged, ground and matched to give a smooth cut with or across the grain.

No. 606 OHLEN-BISHOP DADO SAW is 6" diameter. Set consists of two ¼" outside cutters, two ⅛" inside cutters, one ¼" and one 1/16" inside cutter. Where wider cuts than 13/16" are required extra inside cutters may be added.

Ask your supplier or write for complete information and prices.

OHLEN-BISHOP

1303 Kinnear Road, Columbus, Ohio



One indispensable tool that multiplies the value of every machine tool in your shop

Angle set-ups for your drill press, shaper, saw and other machines . . . and for bench work . . . without special jigs or fixtures. Simple 1-minute, 2-step operation. Lock the work in a "Yankee" Angle Vise. Adjust for the angle and engage positive adjustment lock. Angle adjustment does not interfere with full capacity of jaw opening. You're set up for every stage of the job, from bench to machine and back to bench. Attaches quickly to swivel base on bench or to table of any machine. Two sizes, 2" and 2¾" jaws, with or without swivel base. Write for Vise Folder and "Yankee" Tool Book.

YANKEE TOOLS NOW PART OF STANLEY THE TOOL BOX OF THE WORLD

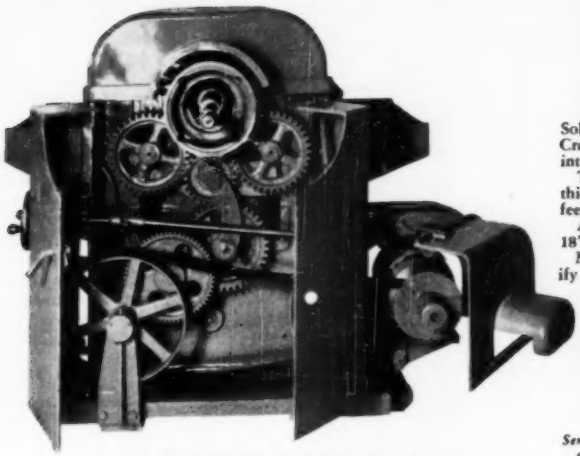
NORTH BROS. MFG. CO.
Philadelphia 33, Pa.

More than 50 years of engineering "know how" stand behind the features of this Crescent Planer!

- 4-knife round safety cutterhead helps students produce a smoother surface finish with ease.
- Adjustable chipbreaker assembly has ⅜" yield. Arranged so it cannot strike the knives.
- Ball-bearing type motor is used. Motor shaft built directly on the cutterhead cylinder.
- Hinged steel doors protect gear and variable drive assembly against dust and dirt.

Safe for students, because it's *totally hooded...*

CRESCENT P-24 Planer



This side view shows the solid metal doors that keep students away from gears and variable drive.

Solid metal doors protect students against moving parts, in the Crescent P-24 Planer. That's typical of the safeguards Crescent builds into all of its machines.

The 24-inch planer shown here handles stock from ⅛" to 8" thick; as short as 3½" (butted); as wide as 24". It has a rate of feed from 20 to 60 f.p.m. Variable-speed drive is standard equipment.

Also available is the Crescent P-18 Planer which surfaces stock 18" wide by ⅛" to 6" thick.

Many school shops are now equipped with Crescent Planers. Specify *Crescent* on *your* requisition for woodworking machinery. The creditable work produced by your students justifies your choice.

Your nearby Crescent distributor can supply Crescent Planers on easy time payments that suit your budget. Ask him for complete details.

POWER TOOL DIVISION
Rockwell MANUFACTURING COMPANY
MILWAUKEE 1, WISCONSIN

Send coupon for free copy of Crescent catalog.

The complete Crescent line also includes Jointers (8"-12"-16") • Saw Table • Shaper • Lathe • Mortiser • Disk Sander • Band Saws (32"-36") • Tenoner

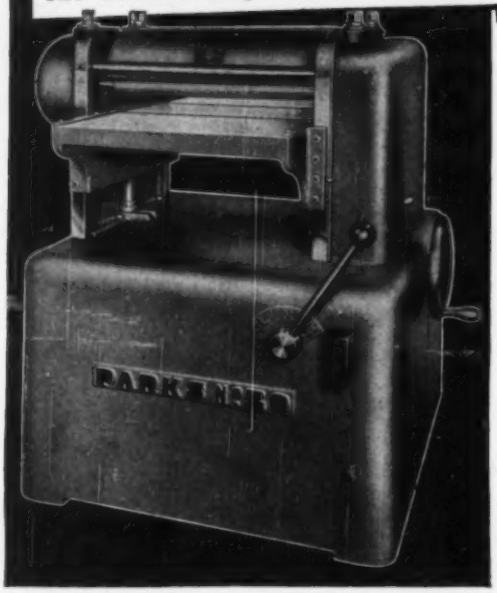
TEAR OUT COUPON AND MAIL TODAY!

Power Tool Division
Rockwell Manufacturing Co.
909 Pine St., Milwaukee 1, Wis.

Send me, without obligation, a copy of the Crescent Woodworking Machinery catalog.

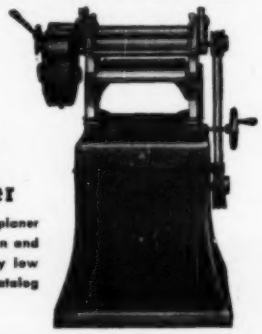
Name.....
Position.....
School.....
Address.....
City.....(....) State.....

The Sensationally NEW Low-Priced



PARKS No. 20 20" PLANER

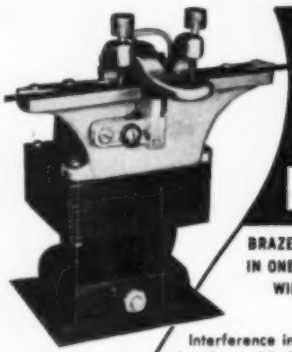
Here is a modernly designed, rugged, high-speed, low-priced planer that is ideally suited for every shop and industrial plant requiring a quality surfacer. The Parks No. 20 Planer has a four-knife cutterhead with a speed of 3600 R.P.M. and offers two feed speeds — 20 and 40 F.P.M., and 40 and 80 F.P.M. Write for complete descriptive literature.



The PARKS Heavy-Duty 12" x 4" Planer

A compact, sturdy, thickness planer that offers mill planer precision and ruggedness at a sensationally low price. Write for descriptive catalog sheet.

The PARKS WOODWORKING MACHINE CO., Dept. 22-EE, 1546 Knowlton St., Cincinnati 23, O.



ERWOOD ELECTRO BAND SAW BRAZER

BRAZES BLADES UP TO ½" WIDE IN ONE OPERATION AND UP TO 1" WIDE IN TWO OPERATIONS

Complete with brazer, 6 ft. cord, plug, brazing material and fluxes. Shipping weight, 11 lbs.

ONLY $19.75

Interference in class work due to broken band saw blades is eliminated with an Erwood Band Saw Brazer. It does the same repair work as brazers which cost nearly four times as much. The Erwood quickly pays for itself in less "down-time" on machines. It also permits additional savings resulting from making your own band saws from coil stock. It permits use of projects involving inside contour sawing.

The Erwood Brazer consists of high current transformer with two resistance electrodes arranged in clamping device. Built for 110 volt, 50-60 cycle operation or 220 volt, 50-60 cycle operation. Light in weight, it can be moved to any convenient position.

GUARANTEED TO GIVE COMPLETE SATISFACTION

See your dealer or write

The ERWOOD Company

210 WOODSTOCK ST. • CRYSTAL LAKE, ILL.

INDIVIDUALY TESTED TO INSURE BETTER PERFORMANCE

IMPROVED Spring Clamp
In three convenient sizes

"C" Clamps
Openings 1 in. to 14 in.

Hand Screw
All popular sizes

Quick Clamps
Openings 4 in. to 5 ft.

No. 640 IMPROVED "I" Bar Clamp
Openings 2 ft. to 10 ft.

THERE IS AN INDUSTRIAL DISTRIBUTOR STOCK NEAR YOU

HARGRAVE CLAMPS

• Hargrave Clamps have been constantly improved with the aid of skilled mechanics to offer greater operating advantages and increased durability. Individually tested, they must be stronger, tougher and flaw-free. Made in openings from ¾ in. to 10 ft., from ½ in. to 16 in. deep.

WRITE FOR CATALOG showing the complete line of Hargrave Individually Tested Clamps, Chisels, Punches, Brace Wrenches, Star Drills, Washer Cutters, File Cleaners, etc.

Waverly & Main Aves.
Cincinnati 12, Ohio

HARGRAVE Tested Tools
THE CINCINNATI TOOL COMPANY

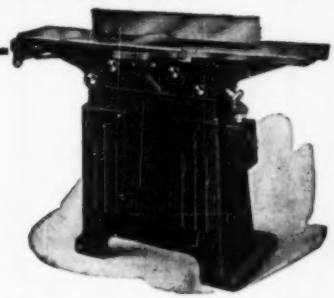
Hotpack ELECTRIC HEAT TREATING FURNACE

● Hardening, drawing, tempering and annealing or normalizing of dies, punches, gages, and fixtures or other parts are performed readily with redesigned Hotpack electric box furnaces. Made in three sizes with from 165 to 1680 cubic inches of working space, they operate in range of 300° F. to 2000° F. Automatic indicating-controlling pyrometer calibrated in fahrenheit and centigrade is built-in. Limitstat automatically turns off furnace at preselected temperature. Pilot lights indicate operation of electric heating elements which are encased in ceramic. Elements can be serviced conveniently. Heat loss is prevented by ample insulation, and welded steel cabinet is finished in black wrinkle enamel.

Write for catalog sheets with complete details.

The ELECTRIC HOTPACK CO., Inc.
5067 Cottman Street Philadelphia 35, Pa.

"OLIVER" No. 144 Hand Planer and Jointer



A heavy type Jointer that is ideal for school shops

This sturdy "Oliver" Jointer is the favorite of woodworkers in industry and in school shops. They find it does excellent work, and is most convenient to operate. Takes stock up to 8 inches wide. Work slides smoothly over the long (60 inches), highly polished tables. Circular safety cylinder runs in self-aligning double row ball bearings. Bevel fence is adjusted from square to 45° across the table. Table lowers for rabbeting up to ½-inch. Fitted with new automatic knife guard for utmost safety. *Write for Bulletin No. 144.*

"Oliver" makes a full line of Jointers in sizes from 6 inches to 30 inches.

OLIVER MACHINERY CO., GRAND RAPIDS 2, MICH.

NEW! 30 Early American Designs...

15 PLANS TO A PACKET

25¢ POSTPAID

New project plans... large photographs and working drawings on 8½ x 11 sheets, punched for loose-leaf binder. All new designs, adaptations of Early American. Each series contains 15 plans... just 25¢ for the packet.

SERIES A	SERIES B
Cricket	Miniature cradle tray
Spice cabinet & mirror	Trinket box
Knife and fork box	Miniature chest of drawers
Match box	Spice chest
Miniature blanket chest	Spice box
Nutmeg box	Corner candle stand
Wall rack	Coffee table
Napkin holder	Book shelf
Colonial mirror	Spice cabinet
Miniature cradle	String box
Desk box	Salt box
Mirror, shelf & drawer	Shoe shine cabinet
Tray	Footstool
Pipe & match box	Kindling box
Candle stand	Treasure box

HARDWARE • HAND TOOLS
ELECTRIC TOOLS • STEEL STRAPPING

Stanley Tools, Dept. IA-349, New Britain, Conn.

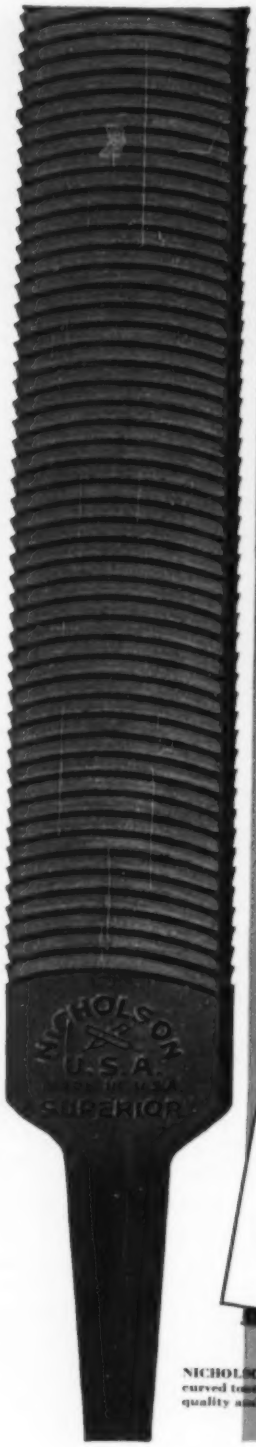
Please send me ( ) Series A and ( ) Series B of the new Early American Plan Packets. I enclose 25¢ for each packet.

Name.....

Subject you teach.....

School.....

City and State.....



This Nicholson campaign ad is one of many appearing monthly in *The Saturday Evening Post*.

STEADY advertising and good distribution can help a product gain the top, but only consistently *high quality* and *good value* can keep it there. That's where Nicholson and Black Diamond files have been for many years—to make Nicholson the world's largest file manufacturer.

High quality in these world-famous files is a combination of a number of things: Expert design (always *The right file for the job*), high-grade file steel specially made to our own specifications, even-surfaced blanks and accurate cut, uniformly correct hardening . . . these are major features assured through rigid controls and check-ups at every stage of production.

You'll turn out better trained grads with dependable, fast-cutting, long-lasting Nicholson or Black Diamond files. Let your industrial distributor or hardware merchant be your supplier.

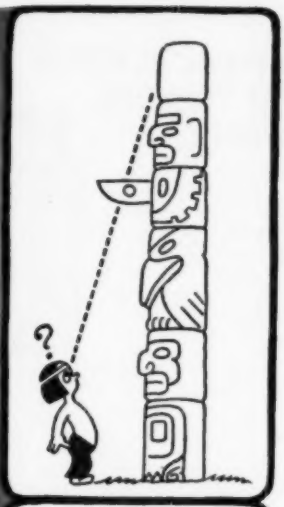
"FILE FILOSOPHY" (*40 illustrated pages*)—*single copies free on individual requests from school officials or instructors. Extra copies 25c each (toward cost of printing and forwarding).*

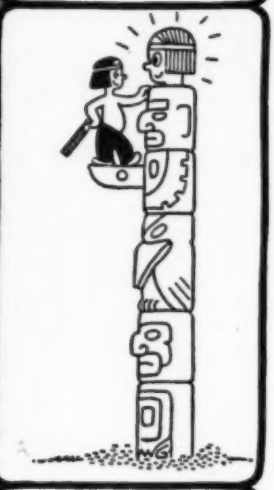
NICHOLSON FILE CO., 47 Acorn St., Providence 1, R. I.
(In Canada, Port Hope, Ont.)

NICHOLSON FILES FOR EVERY PURPOSE

WHAT MADE THEM "LARGEST SELLING"?

NICHOLSON SUPERIOR—curved tooth file of extra fine quality and workmanship.





a Nicholson file for every purpose

World's largest selling file brands — available at good hardware, implement and industrial-supply dealers.

NICHOLSON U.S.A. and BLACK DIAMOND

VOL. 38, NO. 7 SEPTEMBER, 1949

Industrial Arts and Vocational Education

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

THE BRUCE PUBLISHING COMPANY | CENTRAL OFFICE: 20 N. WACKER DRIVE, CHICAGO 6, ILL.
540 NO. MILWAUKEE ST., MILWAUKEE 1, WIS. | EASTERN OFFICE: 330 WEST 42ND ST., NEW YORK 18, N.Y.

TABLE OF CONTENTS

Background and Outlook in Industrial Education ..... *H. H. London* 257
Selenium 258
Improving the Industrial Arts ..... *Deyo B. Fox* 259
Upgrading Vocational Teachers ..... *Thomas Diamond* 261
Some Leaders in Industrial Education ..... *William T. Bawden* 263
Teacher-Counselor Relationships ..... *Harry A. Goldstein* 265
Selection, Preparation, and Presentation of Subject Matter ..... *Donald F. Hackett* 266
The School-Shop Toolroom ..... *E. LeRoy Longley* 268
Editorials 270
Proceed According to Plan ..... *Donald B. Greenwood* 271
Shop Personnel Organization ..... *Bruce J. Gammons* 273
Public Relations and Vocational Education ..... *Lynn Ogden, Kurt A. Schneider,* and *Earl Kimball* 274
Recognizing the Value of Driver Education ..... *Herbert J. Stack* 275
The Machinist's Hands ..... *Waldemar Schweisheimer* 276

Problems and Projects

A Week-End Cabin ..... *J. Edgar Ray* 278
Shoe Repair in Rural Areas ..... *Everett A. Grant* 279
An Adventure in Architectural Drafting ..... *Anthony Calandro* 280
Drawing Board Support for the Woodshop ..... *Carlton H. Shindler* 281
Coffee Table ..... *Franklin H. Gottshall* 282
Indium 284
Aluminum Cigarette Box ..... *Homer C. Rose* 284
Cars of Tomorrow by Boys of Today ..... *Bernard W. Crandell* 285
Silicon 286
Functional Bedroom Furniture ..... *E. J. Rawson* 287
Handy Miniature Spirit Level ..... *I. M. Fenn* 290
The Modern in Soldering ..... *A. F. Bick* 291
Equipment Made from Salvaged Radio Parts ..... *William R. Stocking, Jr.* 291
Differentiating Between Magnesium and Aluminum ..... *Louie S. Taylor* 293
Indian Silversmithing ..... *Ben Hunt* 294
Molybdenum 296
Combination Bench Hook and Shoot Board ..... *Harrison Neustadt* 296
Modern Teacher's Desk ..... *Earl Kimball* 297
Picnic Table with Masonite Top 300
Square-Root Spiral Curve ..... *John H. Clark, Jr.* 301
End Table ..... *E. R. Glazener* 302

Association News 304
Personal News 28A
News Notes 32A
New Publications 34A
Shop Equipment News 36A

The School Year 1949–50

Well, what did you do all summer? Whatever it was, we hope it was enjoyable and that it was profitable and will continue to be so for the future.

No doubt, a large number of shop teachers attended summer school. No doubt, too, a certain percentage of those who attended these summer sessions were disappointed because they did not get exactly what they expected. However, if they make the best use of what was taught to them, they will gradually learn that they got more out of their six or eight weeks in summer school than they had imagined.

Even the most disgruntled must admit that not all was bad. Probably if a comparison would be made between that which was good and worth while, with that which was objectionable, the difference would not be so great after all.

After all has been said, the summer vacation is over. Classes are about to be reopened. Shop teachers are again confronted with the challenge of doing a good job with a new and interesting group of American youngsters. They have a real obligation. They are preparing those who are to take the place of the leaders of today.

Much depends on whether we, the teachers of today, truly understand what is expected of us. Wrong attitudes must be corrected, characters must be formed and re-formed, skills must be transmitted. These are the things we must do. Are we prepared to live up to our duty? If we are, our vacation was good, no matter what we think about it. If we are not — well, it's just too bad and we really cannot lay claim to being good teachers.

Coming Conventions

Sept. 12–16. National Recreation Congress, at New Orleans, La. Headquarters, Municipal Auditorium. Secretary, T. E. Rivers, 315 Fourth Ave., New York 10, N. Y.

Sept. 19–23. American Chemical Society, at Atlantic City, N. J. Chairman, James J. Doheny, 1155 — 16th St. N.W., Washington 6, D. C.

Sept. 23–26. Ohio Vocational Association, at Columbus, Ohio. Headquarters, Hotel Fort Hayes. Secretary, George L. Brandon, 102 Ed. Annex C, Ohio State University, Columbus 10, Ohio. Chairman, Wm. B. Logan, 223 Journalism Bldg., Ohio State University, Columbus 10, Ohio.

Oct. 2–5. National Conference on High School Driver Education, at Jackson's Mill, W. Va. Secretary, Robert W. Eaves, National Commission on Safety Education, 1201 Sixteenth St. N.W., Washington 6, D. C.

Oct. 9. Association of Trade and Technical Administrators of New York State, meets at Lake Placid, N. Y. Headquarters, Lake Placid Club. President, Dr. Edward H. Lang, Smith Technical High School, Syracuse, N. Y.

This Month's Cover

The photograph for the September, 1949, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION was submitted by Robert B. Newell, machine-shop instructor, at the High School, Springfield, Ill.

It pictures the instructor giving a demonstration of how to use the vernier gauge to his students in the vocational machine-shop class.

We Are Sorry

Unfortunately, we erroneously credited the receipt of the cover picture for the June issue to Richard Thorpe Jones. The picture actually was sent us by Ivan Hostetler, head of the department of industrial arts, North Carolina State College of Agriculture and Engineering of the University of North Carolina, Raleigh, N. C.

Entered January 2, 1914, as Second-Class Mail Matter at Milwaukee, Wis., under Act of March 3, 1879.
Copyright, 1949, by the Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, November 25, 1930.
Published monthly except during July and August.

Subscription Information. — Subscription price in the United States, Canada, and countries of the Pan-American Union, $3.00 per year, payable in advance. Postage, foreign countries, 50 cents. Copies not over three months old, 35 cents; more than three months, 50 cents.

Discontinuance. — Notice of discontinuance of subscription must reach the Publication Office in Milwaukee, at least fifteen days before date of expiration. Notices of changes of address should invariably include the old as well as the new address. Complaints of nonreceipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

DELTA MILWAUKEE®

Note: School orders get special attention in our delivery schedule! Order now for Fall semester.

New!

$795*

Complete with motor and switch f.o.b. Leetonia, Ohio Plus zone delivery charge.

DELTA 12" TILTING-ARBOR SAW

Gives you the capacity of a 16" saw — without the cost. Rips and cross-cuts stock 4⅛" thick. Takes 2⅝" cut, with blade tilted 45°. Cuts a dado 1 1/16" wide. Big 3'2" x 4' table has full 16" surface in front of blade for cross-cutting wide boards. Rip fence extends full length of table. Arbor is carried on lubricated-for-life ball bearings. Equipment includes: "Super-Safe" saw guard. Free bulletin AD-448 shows other Delta features for safety, accuracy, economy. Send coupon for your copy.

Now!

Three Tilting-Arbor Saws to meet all your requirements —by DELTA®

See these machines at your nearby Delta distributor. Ask about getting them on deferred payments that fit your budget.

→ *Look for his name under "Tools" in the classified section of your telephone directory.*

$218.50*

without motor or switch

DELTA 10" TILTING-ARBOR SAW

The famous Delta Unisaw®. Rips stock 3⅛" thick. Cuts to center of 50" panel. Table is 27" x 36". Blade tilts 45° to right. Standard equipment includes: Double-face, double-lock rip fence. Lubricated-for-life ball bearings. Patented Auto-Set miter gage with individually-adjustable index stops. "Super-Safe" saw guard. Catalog B-48 gives complete details on these and other features of this popular saw. Use coupon, to request your free copy.

*Trade Mark Reg. U. S. Pat. Off.

New!

$149.50*

without motor or switch

DELTA 8" TILTING-ARBOR SAW

Compact floor model. Takes maximum vertical cut of 2 5/16". 25" x 33" table has 12" surface in front of blade at maximum cut. Rip fence extends from front to back of table. Set-over feature of guide rails increases rip capacity at right of blade from 20" to 27". Equipment includes: Adjustable table insert. Auto-Set miter gage. "Super-Safe" saw guard. Other Delta features. Send coupon for descriptive bulletin AD-455.

**Prices subject to change without notice*

TEAR OUT COUPON AND MAIL TODAY!

POWER TOOL DIVISION
Rockwell Manufacturing Company
660K E. Vienna Ave., Milwaukee 1, Wisconsin

Send me free copies of the following:

☐ Bulletin AD-448 ☐ Bulletin AD-455 ☐ Catalog B-48

Name..... Position.....

School.....

Address.....

City..... (.....) State.....

560-A

-IAVE-
SEPTEMBER . . 1949

Background and Outlook in Industrial Education

H. H. LONDON
Professor of Industrial Education
University of Missouri
Columbia, Mo.

Said one school administrator to another at a recent educational conference, "Industrial education had its day during the war and now it is in for a steep decline." A junior student majoring in industrial education with the idea of becoming a shop teacher said to the writer a few weeks ago, "Isn't it likely that all the jobs will be filled by the time I graduate, and that I won't be able to get a job as a shop teacher?" And the man in charge of a university teacher placement service was heard to say, "The shortage of shop teachers is about over; there are now more men being trained for this work than there are jobs available."

These are the inevitable questions and statements of doubt that accompany all periods of transition and readjustment. Similar statements are undoubtedly being made about many types of work in this critical period. They are indications of the need on the part of those engaged in industrial education and those contemplating entering it to re-examine its background, to look about them to see what there is to be done, and to forecast as accurately as possible the outlook for the immediate future. This article is an attempt to do just that, with the hope that it may provide some professional inspiration and guidance for teachers and students of industrial education.

Organized industrial education was started in the schools of America around 1880 in response to a demand that the schools provide a substitute for the old apprenticeship system made obsolete by the industrial revolution. European in origin, the work was first known as manual training. It consisted of a series of carefully graded exercises designed to develop manipulative skill in the use of common hand tools and tool processes, which skill it was assumed would serve as the foundation for effective work in any occupation of a mechanical nature. Later, due to further European influence and modifications in psychological theory, the work was called manual arts; its content and scope were broadened and schoolmen came to advocate it largely as a means of providing vitalized general education for the masses.

Meanwhile, as the shortage of skilled workers for American industry became more acute and the need for functional education more pronounced, there was an increasing demand that school shop work be brought into a more direct and intimate relation with the rapidly expanding industrial order. Faculty psychology, on which the earlier shopwork was based, gave way to a newer psychological theory which explained learning in terms of specific responses to given situations. The result, in short, was our present two-phased program of *industrial education* — (1) industrial arts and (2) vocational-industrial education, the former being an essential part of general education for an industrial society and the latter a part of our federally aided program of vocational education of less than college grade.

When industrial education was first introduced into the public schools, schoolmen generally opposed it, largely for three reasons. First, they said it was not their business to train workers for industries; they were properly concerned with common learning, not specialized training. Second, industrial activities, they said, lacked content worthy of a place in the school. Third, they believed that industrial education would interfere with the traditional studies and would cost too much. Besides these objections, the student of industrial education should realize that there always have been certain stigmas attached to all forms of work education. In the first place, there is the religious stigma, beginning with Adam and Eve in the Garden of Eden and continued by the early church as a means of discipline. Second, there is the social stigma, growing out of indentured servitude, often confused with indentured apprenticeship, out of slavery and out of the use of work education in penal institutions, reform schools, and schools for the feeble minded. Third, there is the psychological stigma, arising out of misunderstanding and misuse of intelligence test scores and exemplified by the tendency to advise bright students to stick to the academics and dull ones to go to the shop.

Today, however, it could be said that industrial education has the well-nigh universal support of informed schoolmen everywhere. During the seventy-year period in which it has been offered in the schools of America, the following factors have motivated the development of industrial education and currently affect its operation:

1. Industry's demand for skilled workers, to the end that it may compete successfully in the markets of the world.

2. The laboring man's interest in a type of education that will increase his earning capacity as an individual and hence raise his standard of living. (When laboring men seek to improve their economic advantage, they resort to unions for collective bargaining purposes and to vocational education for individual advantage.)

3. John Dewey's crusade for "learning by doing," for which shopwork is a natural setting.

4. The necessity of meeting the needs of the nonacademic boy, brought into the schools in increasing numbers as secondary school population doubled every decade from 1890 to 1930 and is still climbing.

5. The increasing importance and increasing technical nature of industrial occupations, through which over half of America's wage earners now earn their livelihood.

6. The necessity of skilled technicians and sustained industrial production for national security, as exemplified in the last war.

7. The growing universal need for consumer knowledge and skill which will enable the individual citizen to select wisely and to care for and use properly the multitude of industrial products available to him.

8. The necessity of exploring and interpreting to school-age youth the world of industry — from which they are now largely excluded — for purposes of guidance and good citizenship.

9. The general acceptance of the idea of democracy in education, the right of every individual to a type of education commensurate with his interests and needs.

10. Federal aid for vocational education of less than college grade, including vocational-industrial education.

Before World War II, our programs of industrial education were running along rather smoothly, although they had many defects and met only a small portion of the need for this type of education. When the war came, the schools were called upon to convert their shop programs to war purposes. What they did in providing preinduction and war-production training is common knowledge. But, now that the war is passed and we have moved into a new era of technical and industrial development, the outlook for industrial education has changed. It is difficult to foretell exactly what the future will bring in any field of education. However, there is good reason to believe that industrial education will become even more important in the future than it has been in the past.

The age at which youth may enter employment, although temporarily lowered during the war, is gradually being raised. Few below the age of 18 may now expect to find jobs in industry, although an increasingly large portion of them will eventually enter industrial employment. This places upon the school the twofold problem of retaining youth in the school for a longer period and of providing training that will enable them to make occupational adjustment when they do enter employment. How well the school is succeeding in solving the first problem is revealed by the fact that approximately 73 per cent of those of high school age are now in school. The solution to the second problem is largely one of keying the school program to meet the educational needs of the masses. When this is done, industrial education will occupy a much more important place in the school, especially in programs designed for the 80 per cent who will never go beyond high school.

Leaders of labor, management, and education are overwhelmingly of the opinion that the need for industrial arts and vocational-industrial education will be greater in the years ahead than it was before the war.* The program, these leaders believe, must be broader and more extensive, including more activities and reaching more people. There is considerable support for the idea that all youth should be provided with basic industrial education as a background upon which specialists could be developed quickly in case of another national emergency. Industrial operations are becoming more technical, and the need for expanded vocational-technical training is already apparent. The trend is to consolidate small high schools into larger units, and in some cases to create area vocational schools, resulting in both cases in the addition of departments of industrial education. Many small high schools are planning to add co-operative diversified occupation programs. If junior colleges succeed in bringing their terminal offerings into a more direct relation to the occupational needs of the community, industrial education will undoubtedly occupy a larger place in their programs. Finally, there is the need for evening classes to keep apprentice and adult workers abreast of their jobs and to aid them in gaining promotions.

The demand for well-trained teachers of industrial arts and trades and industries still exceeds the supply, and the shortage in certain trades and subjects is likely to continue for some time, as schools act to meet the needs and conditions outlined in the foregoing. In a recent survey of the status and need for industrial education in Missouri, it was found that 183 high schools now having no industrial arts desired to add this work when teachers were available. In addition, 97 schools already having some form of industrial arts desired to expand their program still further when teachers are available. Twenty-six school systems having no vocational-industrial education expressed a desire to add this work when teachers are available. Twenty-seven school systems now offering some form of vocational-industrial education expressed a desire to expand the work when qualified teachers could be found. Similar conditions undoubtedly exist in other states.

The time has already arrived when most shop teachers are required to have at least a bachelor's degree. The better positions demand men with the master's degree as well as broad industrial experience. Permanent college positions, which are now difficult to fill, almost invariably demand men with the doctor's degree.

Industrial education is primarily a man's field and consequently salaries are considerably above the average for teachers in most fields. In many cases, they are equal to or better than those paid in the field of school administration. Being technically trained, teachers and supervisors of industrial subjects are often sought by industries at attractive salaries as training directors and members of personnel departments.

In spite of the pessimistic statements heard now and then about industrial education, the outlook appears favorable for the immediate future. Ex-service men, high school graduates, and young industrial workers who are interested in teaching as an occupation and have aptitude for the work, may expect to find employment, once they are well trained as teachers of industrial arts or trades and industries or as training directors in private business and industry. Teachers, co-ordinators, and supervisors already employed in these fields may look forward, it would seem, to an active period ahead, but one in which there will undoubtedly be more competition and higher efficiency demanded of them.

*Hostetler, Ivan, *An Analysis of Opinions on Industrial Education With Their Implications for a Program in the Public Schools*, unpublished Doctor's Dissertation, University of Missouri, 1945.

SELENIUM

Selenium (Se) might be termed an element which is both metallic and nonmetallic. In its nonmetallic properties it is very similar to sulphur existing in six allotropic forms. Amorphous selenium is a finely divided brick-red powder with a specific gravity of 4.26. Metallic selenium is made by fusing the vitreous variety and cooling slowly; the specific gravity of the metal is 4.82 and melting point about 215 degrees Centigrade. In the solid state, selenium is odorless and tasteless, but the vapor has a putrid odor; it is poisonous.

One of the most interesting uses of selenium is in photoelectric instruments. When properly prepared the electrical resistance of selenium varies with the intensity of light even to the extent of very small amounts of light. This peculiar characteristic is used for light measuring instruments and for electric eyes. Selenium is also used in copper and steel to improve machinability.

Selenium is available in stick form and as a powder. It can also be obtained alloyed with copper or with iron. — *Belmont "Metal of the Month."*

Improving the Industrial Arts

DEYO B. FOX
Director, Division of Vocational and Practical Arts Education
Western Michigan College
Kalamazoo, Mich.

Since Calvin Woodward and others inaugurated manual training, practical work in the school shops has made much progress. Especially is this true since the time that this type of work has become known under the name of industrial arts. We have gone through many educational eras, all of which have posed problems. Those problems have been solved with different degrees of accuracy and conclusiveness. Much has been said and written about the history and philosophy of industrial arts education, the administration, supervision, and correlation of industrial arts, and the organization and methods of teaching in the industrial-arts field.

The first report on "Standards of Attainment in Industrial Arts Teaching" was brought out in 1929 by the Industrial Arts Section of the American Vocational Association. Subsequently, five others followed, the final one in 1934. More recently, in fact only two years ago, a revision of the 1934 booklet has been prepared which is now available under the title "Improving Instruction in Industrial Arts."

There is a real need to improve and expand our industrial-arts program as an integral part of our total program of education. This poses many problems but we shall always have problems; we are looking for, and want problems. They are what keep us going, always challenging us to do the job just a little bit better, bringing about improvement.

Increased Number in School

Because of limitations of space, only two or three problems which clamor for almost immediate solution will be discussed. The first one is brought up by the fact that according to the estimates of the U. S. Census Bureau, 26,000,000 boys and girls between the ages of 6–17 years will be in school by 1950, due to an increase in our birth rate. The increase over the present number is two million. This has implications in a need for expanded and improved school facilities, including the industrial arts.

Improved and expanded industrial arts and other educational-recreational facilities are needed to help combat the increase in juvenile delinquency and crime. According to recent bulletins of the Federal Bureau of Investigation, there has been a 13 per cent increase in crime in the urban areas, and a 19.6 per cent increase in the rural areas, over the preceding years. The nation's murder rate has jumped 28.5 per cent and the robbery rate 31.8 per cent. Likewise, all other forms of crime have increased.

The FBI called this particularly alarming in view of the fact that each of its two preceding bulletins also reported a definite rise in crime. More and more crime is being aided through the use of scientific developments and inventions, e.g., the using of hypodermic needles by criminals in attacking and quickly putting to sleep a victim whom they intend to rob. Another device among others is the light by which the criminal can see but the victim cannot.

These are problems that should not be left to be solved by sociologists, criminologists, and penologists alone. They have implications for the teacher, too, especially when we consider that much of this crime is being committed by boys and girls of school age. Perhaps there is something more that we can do to help to develop teachers who can aid in the correction of this antisocial behavior. A careless teacher can engender dishonesty through allowing slipshod work and low standards of achievement. Industrial arts provides opportunity to promote honesty, dependability, self-control, co-operation, and other characteristics desirable in the training of a respected and law-abiding citizen.

The well-prepared industrial-arts teacher devotes himself to creating appreciations and enthusiasm for the finer things in life. He aspires to give his pupils desirable character traits, and he gives special attention to their development, because he knows this is one of the most important parts of his job. He realizes that to bring about certain changes in his pupils, he must provide experiences that will promote those changes, and he must be certain that correct interpretations are made of them.

Citizenship

The schools of this nation have been long concerned with the problem of education for citizenship. Statements of objectives for educational programs made during the past century have emphasized the development of citizenship. Yet, with all the emphasis on citizenship, there are evidences that the program of education today is not as effective as it should be. Witness the increase in juvenile delinquency already mentioned, the struggle between management and labor, the testimony of men in World War II, some of whom state that they do not understand what the war was about, the existence of black markets, the increase in the divorce rate, and so on.

These are sufficient to suggest that if democracy is to solve its problems there is much to be done, and there is need for studying the process through which solutions to such problems are evolved. We as teachers and trainers of teachers have a place in the solution of these and allied problems.

Mental Health

Our complex society of today requires a higher degree of mental and emotional health than was necessary in the more simple society of earlier days. Thousands of our people, and their number is increasing, are suffering from mental ill-health, emotional instability, and personality maladjustment.

Much has been done in recent years by school administrators who have been concerned about the physical health of pupils. But *more* should be done to meet the mental and emotional problems of people. An educational program sufficiently flexible and varied should be offered to meet the needs and interests of all youth. Through this type of program will come better adjusted personalities. Industrial arts has made, and can continue to make, a contribution to this program. Indeed, it would seem that the practical arts and vocational education can make the greatest contribution to the problem of mental health.

Industrial Arts and Industry

It would be trite to remind the reader that a war was necessary to impress upon the schools that in spite of their elaborate program of studies there existed a wide gap, which had been brought about by the lack of adequate instruction in the field of industrial arts. You will recall that soon after the war began, the War Department sent out an urgent call for the schools to provide training in a variety of preinduction courses. Fundamentally, these courses were based on the industrial-arts philosophy. The war is over, and we are still living in an industrial civilizaton. Industrial arts is the recognized representative of industry in the field of education.

Industrial-arts education seems to occupy an enviable position in relation to the total program of general education, so broad expansion of its offerings appear inevitable.

Indeed a great many important and far-reaching educational changes, as a result of the war years, are upon us and some are already taking place in our public schools.

As teacher trainers, we must strive to improve and expand the industrial-arts offerings in our school curriculum, so that they reflect industry as it exists in the world today. Teacher training institutions should lead in up-to-date methods and practices. They should be the center, from which stem newly developed ideas and new ways of doing things. The shops and laboratories in our teacher training classes should be examples of the best in planning, organization, and housekeeping. Increased attention should be given new industries, and new materials and methods of work. All this means there should be continuous study and frequent tours and visits to industrial and business establishments.

Public Relations

Life has become so complex, its contacts so numerous and varied, its pace so accelerated, and its strains so increased, that public relations has gained a high rank among the problems in public education today.

Public relations is not just one man's job, but the responsibility of all teachers or employees. The industrial-arts teacher is peculiarly well situated as one of the best public relations agents in a school system.

Public relations has a two-way possibility — the classroom is an extension of the home, and the home is an extension of the classroom.

Public school relations may be defined simply as organized factual information for the purpose of keeping the public informed of its educational program.

Presenting and building up a social philosophy involving methods and procedures of interpretation in a public relations program is the responsibility of the teacher trainers.

When this has been done to the degree that the lay public understands, industrial arts will never be referred to as a "fad or frill," as was the case a few years ago, when some people proposed closing industrial-arts departments in order to effect a decrease in public school costs.

Increased Time Allotment and Numbers of Pupils

Since we are confirmed believers that the industrial arts will do much in preparing youth to take their places in our complex social and economic order, we should somehow or other, improve our product to the point that more time will be allotted to industrial arts in the school class schedules. Also we should urge that increasing numbers of school pupils be provided the opportunity to avail themselves of industrial-arts offerings.

Young people are curious and usually alert to what goes on about them, but present-day communities do not all provide opportunities for observing and understanding occupational life. The schools and, particularly, the industrial-arts teachers are advantageously situated for meeting this need. Special information and insight should be imparted, with an aim to improving social-mindedness, and toward understanding the conditions and problems of industrial employments. Wholesome interest should be created in mechanical occupations to broaden the view of earning possibilities and requirements. The sense of social contribution and individual achievement for social and occupational good is a most important product of the industrial-arts offerings.

Correlation

Industrial arts can be made a basic and fundamental core of a correlated and extended program of education, which will help to turn out better integrated individuals.

Indeed, one of the most important contributions of an industrial-arts program is to stimulate interest in other school subjects and activities. Mathematics, for instance, is to many students a dull, uninteresting subject. To others, a like feeling is experienced concerning physics, chemistry, and other subjects, because little incentive exists for the mastery of subject matter. Let the boy, however, find that he needs mathematics to help him solve problems in the machine shop, a course which he likes, and mathematics will be viewed by him from an entirely different viewpoint. Certain operations which he must learn to perform in order to become a skilled operator require considerable mathematical knowledge. The same can be said about other industrial-arts courses. Related information on many of the products and processes of industry; information which should be a part of all well-planned industrial-arts programs, should stimulate interest in mathematics, geography, science, and other subjects.

Guidance

Industrial arts fits well into a guidance program, even as one of the media for pupils' self-guidance. Indeed, as a part of a basic program of education, it can lead one to economic competency.

Guidance and human relations are built upon the same concept — the concept of co-operation. We have to live with each other; we must learn to get along with one another. The pupil must be taught to make the necessary adjustments to live and work on a co-operative basis in a society of free enterprise.

Human relations is an essential part of business' and industry's basic operation. Large companies have established research centers, and spent much money to carry on work in this field of endeavor; to build up team spirit, and *esprit de corps*. They have adopted the "whole man at work" concept, and are trying to do something

Aviation mechanics at the Chicago Vocational School

about it. They recognize that a worker brings to work with him his ills, pains, illusions, aspirations, and nonverbal complaints. These workers are basically the products of the policies and training in our schools. The implications for teachers and teacher trainers to apply this same concept to the "whole pupil at school" seems obvious.

We want pupils to desire to help others, because teamwork and courtesy pay, and because of the gratification one receives from "doing a good turn." The place to stress the fact that harmony is a requisite of happy home and community life, and that proper attitudes lead to advancement in one's job, is in the school. These attitudes should be fully developed.

To extend the matter of attitudes, tolerance, and understanding a step further, it would appear that we should explain and interpret to our pupils some of the aspects of present-day industrial life, including the problems of management, bargaining and workers' organizations, and the nature of employer-employee relationships.

Fifteen million persons today belong to organized labor. If its growth should continue in the next ten years at the same rate as during the past ten years, the number will approximate 26 million. Some of our young people will become members of these organizations.

Should we not emphasize the attitude that industrial arts became a major area in the curricula of more schools the same as the language arts? Is it necessary or desirable that we be satisfied to allow industrial-arts courses to remain elective subjects, as is the case in so many secondary schools? As has been stated already, industrial arts represents industry in the field of education, as the social studies represents the social part of our living, and English represents our language. Industrial arts has been one of the *smaller boys* of the educational family. Perhaps, it has nearly reached maturity. When that time comes, we can forget the age-old problem of whether or not the industrial-arts teachers should accept only the gifted pupils, or only the less able, or both. Obviously, we would accept both, but definitely for their advancement and improvement in those avenues of industrial-arts education which would match their gifts, needs, and interests. This can be substantiated by the Harvard report, *General Education in a Free Society*, which concerns itself with general education not for the relatively few, but for the masses. While at no point in the report is the term *industrial arts* mentioned, the philosophy underlying and giving place to industrial arts is broadly presented in many places.

Teacher Selection

Since a school is no better than its teachers, we are confronted with a problem, which when even a partial solution has evolved, the industrial arts will be much improved. There is an urgent need for better selection of students who should be trained for the job of teaching industrial arts. Mere recruiting of students for the sake of numbers with which to fill teacher training classes is not the answer. We need intelligent, stable young men who have a sound philosophy of life — men who are able to see the significance of the teaching profession from the social, economic, and character-building points of view — men who obtain a certain satisfaction from contributing a service to the welfare of mankind.

In order to interest such persons in sufficient numbers to supply the market with good industrial-arts teachers, the matter of salary should not be overlooked. It is true that there are other possible inducements as numerous vacations, retirement systems, pleasant work, and the like; but salary is one of the important ones. Likewise, it is true that gains have been made in average salaries of teachers over a period of time.

However, one recent set of governmental data present the average teacher's income as $1,441 in 1939, while today, after taxes, it is $1,957. The average for labor is $2,300. This increase fails to offset higher prices for food, rent, and clothing. Teachers' incomes are worth only 95.8 per cent of their worth in 1939. The increase in the cost of living for teachers is well over 60 per cent in terms of 1935–39 dollars.

We should do what we can to try to correct some of the inequalities that have existed in the teaching profession too long. We must try to get guidance counselors and others to help; persons in position to do so, should "talk up" teaching to prospects for the teaching profession. This will improve the industrial arts.

To summarize — if we agree, we should constantly strive to improve the industrial arts as a means of helping to solve some of the ever existing problems, as implied through: increased school membership, increase in crime and delinquency, better citizenship training, mental and emotional health needs, offering industrial arts to greater numbers of pupils, correlation of industrial arts with other subjects, increased guidance, public relations, better student selection for the training of teachers, and adequate salary adjustments.

After a world conflict in which science and technology reached the utmost supremacy, education for living in an industrial democracy becomes the major concern for all who are responsible for educational programs in our American way of life. It will be through common purpose and complete unity of effort, that the scope of industrial-arts education in the nation's schools will be adequately interpreted and maintained.

Upgrading Vocational Teachers

THOMAS DIAMOND
University of Michigan
Ann Arbor, Mich.

(Continued from page 239 of the June, 1949, issue)

Develop Leaders

In every area of human activity, we find some individuals who are leaders and others who are followers. Both of these types are needed in every organization. This is particularly true in the field of education.

A survey of the educational world would be likely to reveal that the demand for people with qualities of leadership far exceeds the number who are prepared to lead. This discrepancy should not be attributed to the lack of potential leaders, but rather to the absence of opportunities for teachers to develop their potential abilities.

It is believed that the most effective method of developing leadership qualities is by actual participation in the activities usually carried on by people who hold jobs where leadership is necessary. If this is true it would seem to be the responsibility of every administrator to provide opportunities for young men with initiative and ambition to assume some of the duties usually performed by the administrator himself. By this means the beginner develops his ability to carry responsibility and the superintendent or director has opportunities to dis-

cover in his staff those individuals who have leadership possibilities.

At first the duties assigned might be quite simple but their difficulty might be increased gradually as the young person shows evidence of ability to carry a greater load.

It is not suggested that the teacher's load be reduced in order to permit him to carry the extra work. If he is the right type of person he will welcome the chance to do administrative work even at the cost of having to work extra hours. If, when the opportunity is presented to a teacher, he complains and shows evidence of dissatisfaction, he may be excused from the additional burden. At the same time the administrator will have learned that the individual in question lacks some of the qualities of a leader.

When the right type of person is found who carries on and performs efficiently the tasks assigned to him the administrator will have little difficulty in selecting a candidate when and if an opportunity for promotion appears.

Observe Your Teachers at Work

There is a tendency on the part of some administrators to spend their time on the administrative details of their job, and to slight their responsibility for the improvement of instruction.

If he hopes to upgrade his teachers it is imperative that he take the time to observe them while they are teaching. If this is done in a spirit of helpfulness rather than that of criticism, a condition will develop in which the teachers welcome these visits, and react kindly to any suggestions made.

It has been said that it is important that the director concern himself with the problem of building up the morale of his teachers. This can be achieved more effectively if such comments as are made are presented tactfully. In so far as is possible they should be constructive in character and should be given privately. If they can be offered in the form of a suggestion they are likely to be more acceptable.

It should be kept in mind too, that some of the comments may be complimentary rather than derogatory. When it happens that a teacher has done something worthy of commendation the director must make it clear to the teacher that the fact has been noted. In the process of upgrading teachers this is just as important as correcting any faults that may appear.

During the visits the administrator should have in mind specific things he considers worthy of note. Among these are the following:

1. He should note the strong points as well as the weak in the teaching being done. The teacher should be complimented for the things that are good, and constructive suggestions should be given concerning those that are not so good. By this means the administrator is in a position to pass on to the teacher any ideas he may have picked up during his visits to other classes, while at the same time he is commenting on the worth-while things he has observed during his present visit.

Observation of teaching should be a continuous activity since one cannot judge a teacher by one visit. Moreover, additional visits must be made to discover the extent to which the teacher has improved as a result of the suggestions made.

2. It is of interest, and it is a measure of a teacher's work to know the extent to which the pupils are applying what they have been taught. It is generally recognized that a teacher may have gone through the procedure in teaching, but the pupils may not have learned the lesson. If the pupils show evidence of having grasped the lesson it is likely that this will be manifested in how they perform on the job. If it is found that the principles taught are not being applied it suggests to the observer that he must look further to discover why this is true.

3. Then too, good teaching involves good shop organization. It is true also that some teachers show greater initiative than others in the manner in which their classes are organized. Because of this it is desirable that the observer note evidences of good or bad organization, and bring to the attention of those teachers whose classes lack this quality the ideas he may have observed in other schools or classes.

4. It is probable that anyone who is observing a class will note only the outstanding strengths or weaknesses. Since the time may not be appropriate during the class period to discuss these with the teacher, some administrators carry cards with them on which they record the results of their observation immediately after they have left the building. These notes serve as a reminder when an opportunity occurs to discuss them with the teacher. Added to this, if they are filed with other reports on the same teacher, they serve as an excellent guide if and when the administrator is called upon to rate his teachers.

Check on Teacher's Achievement

It is important that the director check on the achievements of each teacher. The teacher may need help and, if the director is to provide the needed assistance he must inform himself concerning the teachers' strengths and weaknesses.

It should be said that the discovery of strength is just as important as finding weakness, as this provides an opportunity to raise morale by commenting favorably on success.

When a weakness is found it provides an opportunity for the director to explore the reasons for it and perhaps suggests methods of improvement.

All teachers should be subject to this check since it is more than likely that each one will fail in some respect. However, it is unlikely that all teachers will fail in the same areas so the director must scrutinize the work from as many angles as possible.

This experience with each teacher enables the director to act in the capacity of distributor of the ideas he gathers as he visits each classroom.

Aid Teachers in Preparing Rating Sheets

Most directors have the responsibility of rating their teachers. When this is done the teachers have a right to know the basis upon which they and their work are rated.

In order that they may become familiar with criteria used in the rating scheme, it is a good plan to give them an opportunity to suggest the points upon which they believe they should be rated.

In order that they may become familiar with the criteria used in the rating scheme, it is a good plan to give them an opportunity to suggest the points upon which they believe they should be rated.

With this in mind the director should call the group together and assist them in setting up a rating sheet for themselves. After the sheet has been made up they are likely to feel that the rating is a fair one and, as a result, will accept it freely.

There is an additional value in working on such a rating sheet in that it tends to bring to the attention of the teachers those areas in which they are strong as well as those in which they are weak. When they are aware of these they are likely to make the most of their strong characteristics and to improve those in which they are weak.

Personal Matters

A teacher's personal habits might be considered as being outside the jurisdiction of his chief. However, it must be remembered that these same habits do affect the influence of a teacher on his pupils. To the extent that they do influence the pupils to that extent the administrator must consider them.

For example, neatness of appearance does definitely affect those who come in contact with us. This does not mean that one must be dressed in the height of fashion, but it does mean that, whatever one wears in class, must be neat and appropriate for school.

Then too, a teacher should observe the

ordinary rules of cleanliness. In any type of work, but particularly in teaching, it pays to spend five minutes in shaving each morning. It pays to appear each morning wearing a clean collar. And it is not too much to expect a teacher to take a bath when Saturday night rolls around.

The fact that a teacher teaches in a machine shop is no excuse for neglecting these necessities. It is true he may get his hands dirty and he may have a smudge on his nose, but basically, he can still be neat and relatively clean. A clean apron or shop coat does much to maintain a teacher's morale and they demonstrate the principle of neatness and cleanliness that every good craftsman should practice.

The question of language is another personal matter that should be in the minds of every shop teacher. This does not mean that he must have a thorough knowledge of grammar. It does mean, however, that he be constantly on the alert to use good English. Some teachers argue that since they teach in a shop, they should use shop terms. This is true but this does not preclude the using of these same terms properly. Besides there are some shop terms which are not usually used in polite society and it is hoped that the teacher will find it desirable to eliminate those from his vocabulary.

The teacher who is addicted to smoking or drinking hard liquor is likely to claim that it is his privilege to indulge in these when he pleases. While this may be conceded he still has to consider that these habits present a bad example to young people. Furthermore, he must keep in mind that they may be offensive to some of his colleagues as well as to the parents of the children.

In view of these facts, it would seem proper to consider the people with whom he must work and exercise his privilege at times when it will not be offensive.

These are all personal matters but, in so far as they affect a person's teaching the administrator must concern himself with keeping them within bounds acceptable to the students, faculty, and parents, with and for whom the teacher works.

Some Leaders in Industrial Education

WILLIAM T. BAWDEN
Director of Publications
Kansas State Teachers College
Pittsburg, Kans.

(Continued from page 229 of the June, 1949, issue)

William Elmer Roberts (Continued)

The 58th annual report of the board of education of Cleveland, Ohio, for the year ended August 31, 1894, includes the report prepared by William E. Roberts summarizing the activities of his first year as city supervisor of manual training, 1893–94. A few facts from this report will serve to give a partial picture of the manual training (industrial-arts) program of that period in one of the first-rank city school systems of the United States.

It may be noted that the U. S. Census for 1890 credited Cleveland with a a population of 261,000. For comparison: Minneapolis, 164,000; Detroit, 205,000; Washington, D. C., 230,000; Pittsburgh, 238,000; Cincinnati, 296,000; Boston, 448,000; St. Louis, 451,000.

It will be recalled that instruction in manual training began in Cleveland in a small way in February, 1885, so that when Roberts took over the responsibilities of supervisor in the summer of 1893, the schools had had eight years or more of experience, such as it was, with manual training. Up to 1893 instruction had been limited to pupils in high schools, on an elective basis, and provision had never been adequate to accommodate all who wished to enroll. When Roberts received his appointment as supervisor, with instructions to plan a program that would serve all the children from the kindergarten through the high school he faced a stupendous task.

Basis of the Manual Training Program

He adopted as the basis for his program "the fundamental principle of manual training, namely, that it is general education and not special training." He held steadfastly to the belief that the intrinsic value of the work lay in its contribution to general mental development as a result of hand skill, rather than in its contribution to special preparation for any occupation. From this premise he argued that manual training finds a proper and necessary place in all public school life, beginning in the kindergarten, where the training of the hand and eye begins, and extending to its culmination in the work of the high school.

For the four primary grades, the work was based upon the study of form and its development. Instruction was given through manipulative and constructive experiences in clay modeling, paper folding, stick laying, outlining with needle, paper and cardboard construction, and drawing. Incidental instruction was given in color and arrangement, with the view to developing appreciation of good order, organization, and beauty from the earliest grades onward.

In the fifth and sixth grades the boys began to receive instruction in the use of simple hand tools adapted to use in the regular schoolroom, including pencil, knife, rule, try square, hammer, compass, and later the coping saw. These tools were used in the construction of objects from wood, based principally upon geometrical figures derived from the study of form in the primary grades. For the girls a course in needlework offered instruction in the principal stitches required in plain sewing, applied in exercises of progressive dfficulty.

The beginning of light benchwork in wood for the boys came in the seventh and eighth grades, utilizing the principal hand tools in woodworking. For the girls of these grades the work consisted of a course of lessons in plain cooking.

In the first six grades all this instruction was given in the regular classrooms, and by the regular classroom teachers. In order

to make this possible, meetings of teachers by grades were held, at which the teachers themselves received the same instruction and participated in the same experiences which they later gave to their pupils. At these meetings printed outlines were distributed; demonstrations of processes and methods, detailed directions, and suggestions were given; and questions were answered.

The work of the seventh and eighth grades required special rooms for the benchwork for boys and cooking for the girls, and staffs of special teachers.

A City-Wide Program

Incredible as it now seems, Roberts succeeded from his first year as supervisor, September, 1893, in introducing handwork instruction in the first four grades of all the Cleveland schools. The amount of time devoted to this work varied from 20 minutes a week for each pupil in the first grade, to one hour a week in the fourth grade. In these four grades approximately 29,500 children received this instruction. To inaugurate the work approximately $400 was consumed during the year in supplies, consisting of modeling clay, paper, thread, paste, and other items. This figures out to a per capita expenditure of 1.35 cents for supplies, and the same amount was expended for permanent equipment.

The work for the intermediate and upper grades required more varied and extensive equipment, more effort in the preparation of instruction materials, and more time for the preparation of teachers to handle the work. Consequently the introduction of these courses proceeded more slowly. During this first year instruction in knifework was provided for 750 boys, and in sewing for 745 girls, in the fifth and sixth grades of six schools.

For the seventh and eighth grades, two centers were equipped for benchwork in wood for boys, and two centers equipped for cooking for girls. To these centers pupils came from 11 near-by schools, so that instruction was provided for 590 boys and 590 girls during the first year.

The expenditure for equipment for knifework in six buildings was $272; for each woodworking center, $285; for each cooking center, $235 (two centers each); total, $1,312. The cost of supplies for the fifth- and sixth-grade work was 5.5 cents per pupil for the year, and for the seventh and eighth grades, about 30 cents a year for each pupil.

The End of Private Support

As previously noted, the Cleveland Manual Training School was opened in February, 1886, with Newton M. Anderson as principal. The building was erected with funds provided by a company of Cleveland businessmen, and operating expenses were met in part by a special tax levy authorized by the state legislature of one-fifth mill, and in part by tuition fees. Pupils from Cleveland high schools were admitted free, under the terms of the contract between the board of education and the Cleveland Manual Training School Company. Others paid a tuition fee of $15 each term.

"The facts are a little difficult to secure but at some time prior to 1890 someone raised the question as to why, with financial support authorized by the tax levy, the board of education should not have a manual training school of its own. The result was the establishing of West Manual Training School in the old West High School building," as already noted, and the beginning of Mr. Roberts' career in Cleveland, in 1890.

In 1892, the Cleveland Manual Training School Company withdrew its financial support, and the Cleveland Manual Training School was taken over by the board of education. The two Manual Training Schools were separate schools at first, each with its own principal. Later, they were made departments of Central High School and West High School, respectively. In 1902, a department of manual training was established at East High School, and in 1904 a similar department was established at Lincoln High School. Still later, departments were installed at South High School and Glenville High School.

The courses in all these schools, at this period, except Central Manual Training School and West Manual Training School, were limited to two years, freshman and sophomore, of instruction in benchwork in wood, wood turning, and mechanical drawing. However, in some instances, opportunities for more advanced work in these subjects were offered to pupils in the junior and senior years.

With the opening of East Technical High School, in 1908, and of West Technical High School in 1910, the equipment and instruction in metalwork were transferred to these schools from Central High School and West High School, respectively.

Influence of the Russian System of Tool Exercises

In all high schools the manual training work of the early period was largely of the exercise type characteristic of the Russian system of teaching the mechanic arts. This system was based upon an analysis of the tool processes and construction methods in bench woodwork, bench metalwork, forging, machine-shop practice, and others. The original purpose in view (in Russia) was the training of civil engineers, mechanical engineers, draftsmen, foremen, and chemists.

Transplanted to this country through the epoch-making exhibits of the Russian Government at the Centennial Exposition in Philadelphia, 1876, as we have seen, this system gradually became adjusted to the requirements of public schools in the United States through the pioneer work of Dr. Calvin M. Woodward, in St. Louis, Dr. John D. Runkle, in Boston, and their followers.

The Swedish System of Educational Sloyd

In the Cleveland schools the influence of the Swedish system of educational Sloyd soon began to make itself felt also. Roberts' interest in this work may be attributed to the circumstance that in the summer of 1891 he enrolled in a special course for teachers at the Sloyd Training School, in Boston, under the direction of Gustaf Larsson. In his own words:

"Perhaps my thinking in terms of art began there. While Mr. Larsson's models were exactly mechanical, and the processes of construction and methods of teaching were rigidly prescribed, the results were really beautiful examples of proportion in design, compared with the crude stuff being turned out in the manual-training classes of that period. Larsson and I did not agree upon many pedagogical points, and we had occasional ardent discussions — always on a friendly basis. He was a truly fine man, and always ready to help."

Like the Russian system of tool exercises, Sloyd, as originally conceived, was purely utilitarian in character. It consisted essentially of an attempt to revive the declining peasant home industries in Sweden. As late as the 1860's these home industries flourished throughout the country. The small farmer or villager, together with the members of their families, were accustomed to spend long evenings in the construction, by hand, of small objects, both for household use and for sale. But soon after that date there was a marked tendency toward neglect and decay. The chief cause of this decline was said to be the application of steam to industry, and the manufacture of many products by factory methods with the aid of machines in much larger quantities and at much lower cost than similar articles made by hand. Thus the selling prices of household articles produced by hand in the home were so depressed by the competition of machines that it no longer paid the peasant to manufacture them even for his own use.

As early as 1846 an association was formed in Sweden for the purpose of promoting interest in Sloyd, and magazine articles appeared calling attention to its significance in the training of the

young. Educators began to note its potential educational values. In 1872 the Swedish government recognized the place of Sloyd in the educational system, and funds were appropriated to subsidize the training of teachers and to aid communities in introducing the subject in the schools. By 1884 instruction in Sloyd was offered in more than 700 communities.

Educational Significance

The significant fact about both these educational innovations — the Russian system and the Swedish Sloyd — was that they presented analyses of tool processes and principles of construction comparable to analyses of work in other educational subjects. The apparent difference between the two methods or systems was that in the Russian work the principles were presented in the form of abstract exercises, whereas in the Sloyd the principles were incorporated in finished projects of supposed use and value — a very fundamental difference in working with young children. The Russian product lacked personal interest and the element of beauty of design, both of which are found in the Sloyd, as is manifest in a study of the Sloyd models. These were fine examples of outline, form, and proportion, although some of the projects were hardly adapted to American use.

"The problem of the early teacher was to adapt these systems and their methods to the needs of American schools and American children, and in the solution of the problem the Sloyd was undoubtedly the greater influence."

In the Cleveland schools the work with tools and materials was always accompanied and enriched by appropriate instruction in drawing. Provision was always made for initiative and design under interested and progressive teachers, and the element of good proportion and design was always considered.

The work for boys in the seventh and eighth grades during this pioneer period is of great interest historically, since it was the beginning activity that culminated years later in the splendid work of the junior high schools.

Teachers trained in the principles and methods of Sloyd became available in limited numbers in the United States soon after Gustaf Larsson arrived in Boston, 1888, and established the Sloyd Training School, of which the first class was graduated in 1892.

As already noted, in the Sloyd system the emphasis was on the finished product, rather than on the tool processes or exercise. The finished product was intended to be not only something practical and useful, but an object of beauty and good taste as well. While the Swedish concepts of usefulness and beauty sometimes seemed bizarre and out of place to American observers, manual training teachers began to make a synthesis of certain qualities or characteristics selected from the Russian system and from the Sloyd system. In this way there evolved courses of "models" to be constructed — the modern teacher of industrial arts calls them "projects" — and methods of instruction, much better adapted to American schools.

(To be continued)

Teacher-Counselor Relationships

HARRY A. GOLDSTEIN
Tucson Senior High School
Tucson, Ariz.

I. *The Teacher*
- A. The teachers are the principal guidance people in any school.
- B. A guidance program will succeed in any school to the extent that the teachers have a guidance viewpoint and zeal.
- C. Teachers have always done considerable guidance and should continue to do so to an ever increasing degree.
- D. *A student should be referred by the teacher to the counselor only when the teacher feels that the student's problem is so complex or serious that he or she can no longer deal with it successfully.*
- E. The teacher should never threaten to send a student to the counselor.

II. *The Counselor*
- A. The counselor should never hold an interview with a child without adequate preparation.
- B. The counselor is not a disciplinarian in the sense of inflicting punishment or removing privileges. This is the job of the teacher, principal, assistant principal, or dean.
- C. The counselor may be considered a disciplinarian in that he strives to discover the causes of adjustment problems, and bring about a solution which will alleviate the difficulty.
- D. The counselor should be considered as the student's friend, always seeking his welfare.
- E. No stigma of any kind should be attached to a visit by a student to the counselor.
- F. Students should feel free to ask for and receive appointments with the counselor, entirely on their own initiative, to discuss any problem.
- G. Counselors are custodians of cumulative records, which should be kept locked at all times when not in use. Teachers, who are urged to use these records, should get them from the counselor and return them to him.

III. *The Principal, Assistant Principals, and Dean*
- A. In general, except in cases of extreme emergency, teachers and counselors should deal with problem students before they are referred to the principal, assistant principal, or dean.
- B. These officials may be brought into the case at any time that may seem wise in their own opinion or that of the teacher or counselor.
- C. If punishment is to be inflicted, it should be done by the teacher, principal, assistant principal, or dean.

IV. *Referral procedure and teacher-counselor relationships*
- A. In general, referral of a student to the counselor by a teacher should be made on the blanks provided for that purpose. However, a teacher should feel free to advise a student to see the counselor,

when the situation seems to warrant it, without using this slip.

B. A student should not be sent to the counselor as soon as a problem situation arises, nor should he be told that he is going to be sent.

C. The teacher should fill out the referral blank in private and place it in the box of the counselor, or hand it to him or her. A personal conference may be held between the teacher and the counselor at this point.

D. After the counselor has studied the cumulative record of the student he should call him for the conference.

E. It will be necessary for counselors to have the privilege of calling students from class at any time. However, consideration should be taken by the counselor and he should remember not to interrupt the regular classroom routine unless that cannot be avoided because of special circumstances.

F. The counselor should always report back to the teacher on all students referred. This may be either in writing or by personal conference.

Selection, Preparation, and Presentation of Subject Matter

DONALD F. HACKETT
Head, Division of Fine and Practical Arts
Georgia Teachers College
Collegeboro, Ga.

(*Continued from page 233 of the June, 1949, issue*)

Job Assignment: To Make a Utility Box

Specifications: To be made of 22-gauge sheet iron. Each corner to be soldered and fastened with one 1-lb. rivet. Hem edge ¾ in.

Learning Units Involved in This Job

In making this utility box you will have an opportunity to learn the following new skills, and to gain additional practice in the ones with which you are already familiar. The page and title of the book that will tell you how to do these things is indicated after each item.

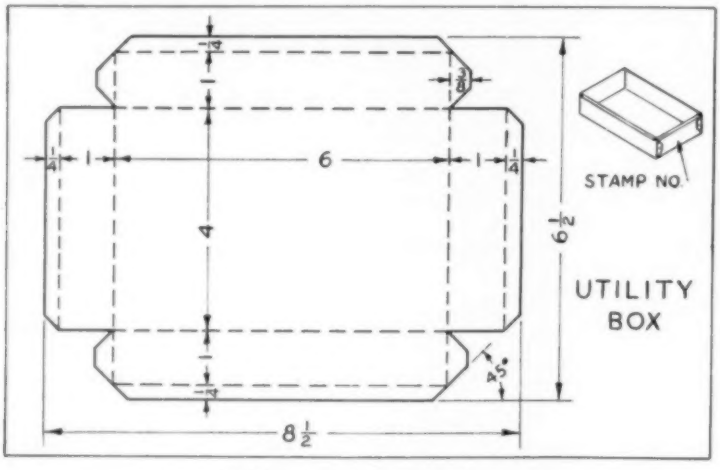
How to:

1. Read a working drawing.
2. Lay out a rectangular object (A., p. 11) (B., p. 24).
3. Use tin snips to cut sheet metal (A., pp. 16–17) (B., p. 25).
4. Use the bar folder (A., p. 23).
5. Bend sheet metal by hand (A., pp. 20–21) (B., p. 26).
6. Drill holes in sheet metal (Demonstration).
7. Use the rivet set (Demonstration).
8. Rivet sheet metal (B., p. 32).
9. Hem an edge by hand (A., p. 22).
10. Solder sheet metal (A. pp. 36–39).

References:

A. Smith, *Units in Sheet Metal Work.*

B. Dragoo and Reed, *General Shop Metalwork.*



Working drawing of utility box

Test of Workmanship

When you have finished the job test your workmanship on the following points:

1. Are the inside dimensions as specified in the drawing?
2. Is the box true and square?
3. Are all the rivet heads round and the same size?
4. Is the hemmed edge even and smooth?
5. Is the surface around the rivets free of rivet set and hammer marks?
6. Are the corners soldered smoothly and evenly and free of excess solder?

Student's Job Plan

Before you start to work on this project read this job plan carefully, and estimate the time you will need to complete the job. Then follow the steps of procedure listed below, checking each step as you complete it. This will save you time, labor, and material, and will result in a better job.

Estimated time required to do job .....
Actual time ..... Cost of job.....

BILL OF MATERIAL

No. of pieces	*Finished size*	*Kind of material*	*Name of part*
1	6½ by 8½	22 gauge iron	Box
4	1 lb.	Iron rivets	Fasteners

Steps of Procedure:

1. Get stock.
2. Lay out lines for hem, folds, and corner cuts as per drawings (A., p. 11).
3. Have instructor check layout.
4. Cut corners (A., pp. 16–17).
5. Turn edges for hem on bar folder (A., p. 23).
6. With emery cloth or steel wool clean corners to be soldered.
7. Fold laps, then ends, then sides (A., pp. 20–22).
8. Locate and drill rivet holes. Use hand drill (B., p. 32) (Demonstration).
9. Rivet corners (B., p. 32).
10. Solder all corners (A., pp. 36–39).
11. Straighten edges and square up box.

12. Apply test of workmanship.
13. Stamp your number where indicated.
14. Figure cost and time required.
15. Have job graded.

Models. Models are small imitations of the real thing. They are valuable in that they bring into the shop articles that might otherwise never be available for study. Some models make good shop projects for either group or individual construction.

Mock-ups. Mock-ups are usually full size displays of the actual parts of a mechanism. For example, the ignition system of an automobile could be arranged on a wallboard to show the actual hookup and even the function of each part. Aids of this type are possibly the most effective single teaching aid. The space required for storage and cost are, however, limiting factors in most shops.

Films. Films, when properly selected and judiciously used, are excellent teaching aids. Sound-motion films are probably the most satisfactory type of training film because they present the sounds or noises as well as the accompanying action. Films are available from many sources including University and College film libraries, industries, and commercial film-renting agencies. When ordering films for class use it is important to place the order sufficiently in advance to insure delivery.

A word or two of caution should be injected into the use of training films, however. Much favorable publicity has been given to the use of films and one might suspect that only good can result. To the contrary, some films are only a waste of time and money in that the instructor himself might equally well demonstrate and explain the same idea in a few minutes and at no cost. Other films include too much extraneous material and thereby conceal or obliterate altogether the original intention.

Sensory Aids. The foregoing teaching aids may all be classified as sensory aids. In addition, many other aids are available to the instructor or may be prepared in relatively little time. In any event these aids are no better than the instructor who uses them. Success for one does not necessarily imply success for another.

Presentation of Subject Matter

When the instructor has prepared his teaching materials as previously mentioned, he is ready to begin his instructional program. This will involve the use of various teaching techniques and procedures as will result in the attainment of objectives and the mastery of the subject matter by the student.

Learning takes place only when the student has the desire and readiness to learn. The normal urge of the student on first entering the shop is to do something or to make something. If the instructor has his program well organized and has selected his projects wisely the matter of creating and maintaining a desire to learn will be accomplished. The state of readiness to learn follows the desire to learn and it is here that the techniques and methods of presentation of subject matter by the instructor either facilitate or hinder the learning process.

Before the class begins. A good start is of fundamental importance in teaching industrial-arts subjects as many lasting impressions are made at the first meeting. To instill favorable impressions it is important that the instructor have his shop in perfect order and his instructional materials prepared and ready prior to the first class.

After the class arrives. The sample lesson plan given earlier illustrates a procedure for the first meeting of a class. By taking a little time to start the class properly much time may be saved later.

Prior to each new unit the instructor should prepare the class by giving a brief overview of the unit, explaining its connection to previous units, and in general pointing out the practical applications of the unit in the light of student interests and possible future applications.

Methods of Presentation. The demonstration and the lecture or discussion methods of presenting subject matter are probably the most commonly used teaching methods in existence. This does not mean that they are the best, however. It does mean that they are the easiest methods of presentation and that they fit into the program without too much effort. While these methods are indispensable in shop teaching they are not always the most ideal. In a single class it may be necessary for the instructor to present an idea in as many as three or four different methods in order to reach every member. The majority of the members of a class usually comprehend instruction given through a demonstration, and/or lecture on the first presentation. If the instructor is capable of presenting his material by using other techniques or methods he is able to eventually reach every member of the class.

Oral instruction. Oral instruction has always been the chief teaching method in the shop despite its limitations. In general, students prefer this type of instruction because it requires less energy and attention on their part and they can place the responsibility for failing to get the idea upon the instructor. In addition the students tend to get the idea that the instructor is responsible for their learning.

Oral instruction, besides not being entirely understood, tends to fade rapidly and repetition by the instructor is the only method of refreshing the students' memory. Its great values lie in its use in giving brief or general instruction and in the fact that the presence of the instructor adds interest.

Written instruction. Originally school shops were publicized as escapes from books and other printed matter. With the change in shop organization the need and value of written instructions became apparent. With properly written and properly used instruction sheets the instructor may expect to realize the following:

1. A greater variety of work offerings.
2. A saving of time in that repetitious and lengthy descriptions are eliminated.
3. A saving in student time in that they do not have to wait on the instructor.
4. Maintained student interest in that they may advance at their own pace.
5. A simulation of industry in that printed instructions find considerable use in many industries.
6. Increased resourcefulness since students cannot "lean" on the teacher.
7. Increased self-reliance and the development of a sense of responsibility.
8. Greater ease in handling large classes.
9. Opportunity for closer supervision of the class.

Some limitations of instruction sheets are:

1. The instructor may substitute instruction sheets for teaching.
2. With improper supervision materials may be wasted, tools may be used improperly, and safety may be ignored.
3. They require much outside time to prepare when ready-made sheets are not available.

In general, these limitations are the result of the inefficiencies of the instructor rather than the instruction sheets. Under close supervision it is possible for instruction sheets to greatly increase the instructor's efficiency.

Demonstrations. Estimates on the amount of learning that takes place through the eyes of an individual vary from 60 to 85 per cent. The demonstration utilizes the sense of sight to a great degree. When properly planned and executed, the demonstration is one of the most effective teaching methods. While demonstrating the "how" of an operation the instructor should include the "why" in order that he may utilize the demonstration technique to its fullest advantage.

In general, there are three types of demonstrations. The class demonstration is used to give instruction that is needed by the entire class. The group demonstration is used to instruct a small group needing the same information. The individual demonstration is used when it is necessary to help an individual student concerning some operation or problem. All three types are necessary and important methods of instruction.

To give a demonstration most effectively the following principles should be observed:

1. There should be a need for the demonstration.
2. Plan the demonstration in advance and arrange all necessary tools and materials for ready use.
3. Arrange students so they can see and hear.
4. Face and talk to the students.
5. Explain purpose of the demonstration and develop interest.
6. Advise students of the important points to look for in the demonstration.
7. Explain new terms and parts.
8. Supplement demonstration with visual aids whenever possible.
9. Use the tools and materials the class must use and hold demonstration to the level of the students.
10. If written instructions are used follow them completely.
11. Perform operations skillfully and at correct pace.
12. Ask questions during demonstration to test understanding.
13. Avoid giving correlated and unrelated material. Related material may be included, however, if it is important to clarify any part of the demonstration.
14. Encourage students to ask questions.
15. Stress safety.
16. Select students to aid with the demonstration when possible.
17. Form connections with previous and future lessons if possible.
18. Summarize key points.
19. Refrain from holding up the progress of the group for a few.
20. Opportunity should be provided for immediate application of instruction.
21. Follow-up and check on effectiveness of the demonstration.

Training Films. Training films, to be most effective, require some preparation on the part of the instructor. After the film has been selected the following principles should be observed.

1. Films are to be used as aids, not substitutes for the instructor.
2. Do not use a film when more effective methods may be used.
3. Guard against the possibility of the student thinking of the film as an entertainment feature. In mentioning the film to the class refer to it as a part of the lesson rather than as a *show*. They should understand that the film is intended to help them learn.
4. Films should be scheduled as they fit into the course.
5. Always preview a film before using it to determine if the content is satisfactory.
6. Make a lesson plan for use when presenting the film. This lesson plan should include the following:
   a) Lesson title
   b) Objectives of presenting film
   c) Time required for lesson
   d) Other teaching methods and devices to supplement the film
   e) Means of securing student interest and participation
   f) Explanations of new terms in film
   g) List of important points students should look for in the film
   h) Summary points
   i) Methods of testing students
   j) Assignments
   k) References
7. Provide seats where all may see.
8. Set up and focus the projector before the class arrives.
9. Make certain the room is properly ventilated and darkened.

After the class arrives:

1. Prepare the students for the film by advising them of the nature of the film and the points to look for.
2. Present the entire film to provide an overview of the content.
3. Review the important points in the film.
4. If necessary rerun the film, or parts thereof, for clarification.
5. Test students on understanding.

The Field Trip

The most effective method of developing an understanding and appreciation of industry is by means of visits to industrial plants. No other training device or method is comparable to the field trip for this purpose for none can simulate all the conditions that actually exist in industry.

In order that the field trip may be educationally worth while, it must be carefully planned. The class must be made to realize that the trip is a part of their regular schoolwork. In conducting a field trip the instructor should observe the following principles:

1. There should be a need for the field trip.
2. Secure approval of both school and factory administrations.
3. Request a conference with a factory representative in order that the trip may be planned most effectively.
4. Prepare the students for the trip by advising them of the important points to look for and explaining to them how they are to conduct themselves on the trip.
5. Small groups should travel through the plant separately so that all may see and hear.
6. During the first class after the trip, the important points of the field trip should be reviewed and a test given to check on what the students have learned.

The School-Shop Toolroom

E. LeROY LONGLEY
Baltimore, Md.

The toolroom of a school shop is one of the most important factors in making school shop teaching and procedure meaningful and effective. The toolroom reflects either credit or discredit upon the teacher's ability to organize his work properly.

The proper arrangement of all tools and supplies in a well-organized shop requires very careful and continuous consideration and planning if the distribution and collection of tools and supplies is to go forward in an orderly and effective manner.

Some of the points to be considered by the teacher when organizing a toolroom follow:

1. Arrangement of tools and supplies
2. Naming tools
3. Checking the tools out and in
4. Changing the toolroom boys
5. Duties of the toolroom boys
6. The teacher's method of checking the tools and supplies at the end of the period.

Arrangement of Tools and Supplies

All tools, except a few reserve tools, are hung on hooks or holders in the toolroom. The reserve tools are stored away under lock and key.

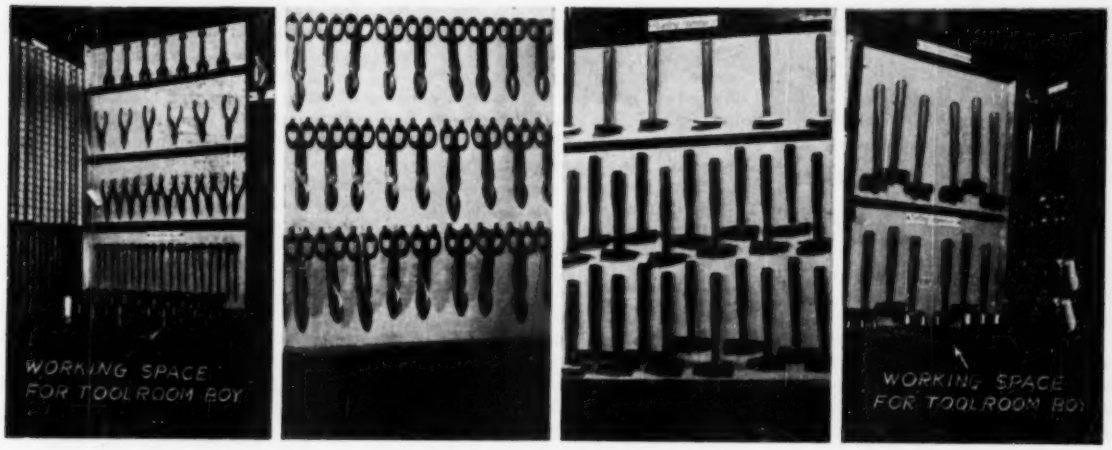
Wherever possible all tools of the same family, like hammers, tin snips, pliers, and the like, are hung on the same panel. See the illustrations accompanying this article.

Hooks and nails are provided beside each tool in order that the tool check may be hung in the place from which the tools have been removed. This informs the toolroom boy immediately who has the tool which is not on the panel.

All tools are hung in full view in order to save time when tools are being returned. Supplies which are not in use are stored away in lockers under lock and key.

To expedite the checking out and in of

Storing planes and planer bits



Tool panels in toolroom

the tools, the tool checks are arranged on two boards, one carrying all the odd numbers, and the other, the even. They are arranged four across the board, divided in the center by the number. This requires two toolroom boys at the beginning and end of the shop period since classes run between 30 and 40 students each. During the slack time only one of the students remains in the toolroom, and works at his own project.

Naming Tools

Every tool or group of like tools are labeled with a sign on which the name of the tool or group of tools is printed in letters about ¾ in. high.

It is not necessary that the student has had previous experience in handling tools in order that he can take care of the toolroom efficiently. He needs only to look at these name signs to learn the names of the tools.

Whenever a demonstration is given, the names of the tools used are repeated several times in order to familiarize the students with the name and appearance of the tools that are being used.

A chart giving the name and a picture of every hand tool is also displayed in the toolroom. If the name of the tool is known, the picture will show how the tool looks. If the shape of a tool is known, it is necessary merely to find a picture of it, when its name can be learned quickly.

Checking the Tools Out and In

Every shop student in our school is given four tool checks at the beginning of the school term. These checks are always used by the same student to whom they are issued whenever he attends a shop class.

At the opening of the class period, the students line up in two rows before the toolroom window, those with even numbered checks on one side, and those with odd numbers on the other. They receive but one tool for each check, and later on they may exchange one tool for another they may need.

Both students and instructor must use tool checks to get tools out of the toolroom.

Instructors or students from other shops or classrooms can get tools only by getting permission from the teacher in charge of the shop.

Checks are hung in the places from which tools are removed. In this way it is easy to fix the blame for any tool that is not returned by the end of the class period.

Students are requested not to keep tools out of the toolroom any longer than necessary. If this rule is adhered to, even a small number of tools will satisfactorily cover a larger group.

System of Changing Toolroom Boys

An assignment board automatically assigns new boys to the job of acting as toolroom boy, each student being in charge for two periods. It is rare that the job goes to the same student more than once a semester. Provision must, of course, be made to have someone ready to take care of this work should the assigned student be absent.

Duties of the Toolroom Boy

Post a copy of the following regulations in the toolroom.

1. The toolroom boy is responsible for all tools, patterns, and equipment in the toolroom.

2. Glance about the toolroom. If any tools are missing, and not so identified by marker, report the names of the missing tools to the instructor immediately.

3. Do not issue tools to instructors or pupils from other shops; send them to your instructor.

4. Tool checks are to be used by pupils and instructor alike.

5. One tool is issued in exchange for each tool check. Hang the tool check in the place from which the tool was removed. One tool may be exchanged for another tool, provided the check is transferred to the place from which the last tool has been removed.

6. Everything has its proper place. Please return things to their proper places.

7. Keep your toolroom clean and orderly at all times.

8. See that tools are in good condition when given out. Simple repairs to tools, such as tightening plane handles and the like, should be made by the toolroom boy.

9. When not busy, the toolroom boy should be working on his assignment at a place provided in the toolroom.

10. Co-operate and help to make this shop run smoothly and efficiently.

11. Do not leave the toolroom without first getting the instructor's permission.

12. Do your work well. You will receive a mark for the manner in which you have handled the toolroom.

Teacher's Method of Checking Tools and Supplies at the End of the Period

At the end of the shop period, after all of the tools have been checked in, the instructor takes a quick survey of the toolroom. If any tools are missing it will be apparent at once, and the tool checks on the hooks will show to whom the tools had been issued.

A card index inventory of tools, stakes, machines, supplies, etc., gives a complete up-to-date check on tools and equipment.

Industrial Arts and Vocational Education

John J. Metz, Editor

OCCUPATIONAL ADJUSTMENT

The teachers of industrial arts and vocational education have unusual opportunities to give their students helpful vocational guidance information. Some of this may be of the type that is not pleasing to the student at all.

At the present time, employment prospects in many occupations are getting to be less favorable than they have been in the past few years. That means that some of the boys who finish our courses will be unable to get the job they may have wanted for a long while.

The number of college graduates in 1949 was greater than last year by about 319,000. The economic situation at present is such that this increase of applicants for jobs caused, and will continue to cause considerable worry and disappointment to many, especially since the rate of hiring has slackened over the past few months.

Many of the teachers and students who have worked during the vacation periods of the past few years, were unable to get jobs this year. This was equally true of many of our graduates. It would have been well if someone had counseled with them, so that this disappointment would not have influenced them too much.

Some of these students had received definite occupational training. They were all keyed up, now that their school training had been finished, to step into a job and apply what they had learned.

The fact that they could not get the job they wanted may prompt them not to take any other type of work until an opening occurs in the field of their choice. That may take months during which they may, and often do, form alliances with bad companions, develop habits of laziness, lose some of the skills and know-how they had acquired while at school, and become troublesome members of the family group.

Our students must learn, to an increasing extent, that the definite plans which they project for their future, are, after all, but tenuous and tentative mental pictures of their desires. It is true, they themselves, their parents, friends and teachers hope that these plans will arrive at fruition, but the realization of the student's hopes may be more or less remote, and the bridging over from the now and then, must be done in a sensible manner. Many of our greatest men worked in various fields before success crowned their efforts.

We must be ready, not only to train our students for a certain trade or occupation, but also help them prepare to bridge over troublesome times. Our grandfathers, and even our fathers, knew how to eke out a subsistence wage for themselves and their families during the weeks, and sometimes months, of the off seasons which annually visited some trades. Let us help prepare our students to become equally self-reliant and independent.

MAKE AMERICA INVULNERABLE

World War II, with all its horrors, cruelties, hardships, has been over for several years, yet peace between the warring nations has not yet been established. Besides that, a cold war is on between nations that had erstwhile been allies. Some of the best informed minds feel that World War III is in the offing, and there is much speculation of what ought to be done to safeguard our country. In the meantime, what are we doing? Are we putting our house in order so that we can safeguard our country and our way of life.

In the Bible we read "Every kingdom divided against itself shall be brought to desolation, and house upon house shall fall." Could the peoples of America be divided much more than we are? The various nations of North and South America are watching us with distrustful eye. Much of this distrust is based on our own actions of the past — actions of which we cannot be proud.

In our own country we have people in governmental positions who seem to base their actions not on considerations of what is best for our country and our people, but upon what is demanded of them by a cabal of intriguing miscreants who have not only succeeded in enslaving their own countrymen, but in placing some of their henchmen into places of trust in our government and even into our armed forces.

Blindness seems to have stricken our people, for they play into the hands of those who are undermining our American institutions. We ought to be working toward preparing our nation for a long siege, should the existing cold war develop into a shooting war. The needs for homes, home equipment, and transportation facilities brought about by World War II have not as yet been met, and yet our senseless quarrels between employers and employees hamper the production of what we need, and embitter us against one another. Those who are engineering the cold war can ask for nothing better — our country "is divided against itself" — it is ready to be "brought to desolation."

Can we teachers do something about this? Can we help to instill a better brand of Americanism into our students than we have in the past? Can we change the perverted methods used by Hitler in indoctrinating the youth of Germany, and out of them prepare something that will make our youth loyal to America and the principles of honesty, justice, and fair play for all? Can we work with industry and labor toward finding a middle path that is fair to both?

Truly, it is not easy to answer any one of these sixty-four dollar questions. They are all challenging, however, and it is worth trying to work out answers. Teachers of industrial arts and vocational education have solved tricky problems before; probably someone in their ranks can show the rest of us how to solve these, too.

THE BEGINNING OF THE SCHOOL YEAR

It is time to make last minute preparations for the new school year. For the shop teachers who have had several years of teaching experience, the opening day holds but little to be anxious about. For the newcomer in the field, the thought of that first day may hold some frightening aspects. A little careful planning now will help all shop teachers to start out the school year in the right way, and assure that their work throughout the two semesters will be efficiently conducted.

Much could be said about the examination of the school shop itself, to see whether the stock rack contains all the necessary material; the tool rack, whether the tools are all there and in good condition; the finishing cabinet to check the condition of the brushes and whether the stains, paints, and other items are present in sufficient quantities. Also whether sufficient form blanks are available for job assignments for the work in the shop and in the cleaning up squads, and progress sheets for recording what each student does throughout his shop course.

Then, it may be well, to glance at some of the pictures, charts, and diagrams you may have on your walls. Blueprints, unless covered with a protective coating of shellac or lacquer, are likely to look quite disreputable after they have been up a year. It may also be good to clear off the bulletin board if that has not already been done. It is well to put up a few new catchy items so that the new students will become used to visiting the bulletin board whenever they enter the shop.

Most necessary of all is to look at the outline of your course. Is that still satisfactory for the coming year? And then, how about the outline of your safety lessons? Can you make it more effective? Industry is making commendable advances in reducing the number of industrial accidents. Shop teachers are preparing future industrial workers for their life's work. Safety know-how is as important, or even more important, than job know-how.

Let's make the school year 1949–50 a real safety year.

Proceed According to Plan

DONALD B. GREENWOOD
State Supervisor, Industrial Arts
Salt Lake City, Utah

One dictionary defines the word *proceed* as "to go ahead, advance; to make progress." It is a word synonymous with the spirit of the times — the spirit of scientific advancement and development; the spirit of growth and progress. Teachers must be mindful of the world in which we live; we must be acquainted with the new ideas and the thinking of those who are leaders in our respective fields of activity. We must keep up-to-date — we must proceed, and we should do it *according to plan.*

Throughout the recent war we have read news bulletins which have stressed the fact that *operations are proceeding according to plan.* The development of our greatest scientific discoveries has, in the majority of cases, been made *according to plan.* In this day and age few things of any great worth are discovered or developed strictly by accident, and it is for us to learn and realize that our progress in life will be more rapid and more certain if we plan ahead and work toward a goal, than it will if we depend upon the uncertainties of chance to bring us the sucess we all desire. We can gamble with life, with money, and with fate itself, but the odds are against us if we gamble with progress.

Know What You Want

What do you want of life? Is it wealth, power, or fame? If so, your chances of attaining your goal in the teaching profession are mighty slim. Do you want security, with time for *family life,* an income of only reasonable proportions, the satisfaction of doing good, and serving your fellow men and the community in which you live? If so, teaching in the public schools may bring you that which you desire. Few become wealthy in the school business — but most members of the teaching profession are well thought of, and are among the leaders of their communities. So decide what you want in life — set your mark — and then go after it with a vigor and determination which will overcome the most rugged obstacles. No matter what you choose to do . . .

Know Your Own Job

It has been said that the *expert* is just an ordinary man away from home. A little serious consideration will prove the fallacy of this statement, for in our everyday lives we are constantly meeting experts — men and women who know their jobs and know them well. True, they may be ordinary men, for they live next door, or in the apartment upstairs, or at the end of the lane around the corner from the drugstore. They fill the factories and the shops, the schools and the churches, the buses, the trains, and the planes. They are *experts* on the job, and they may, if they so desire, be experts on the street when meeting people; they may be experts in the home when living and enjoying to the fullest extent the experiences of family life. So, if you are a teacher, know your job — be an expert. And, since teaching involves much of dealing with others, become an expert in your relationships with others. If you teach, know your field, never cease learning, keep up with the times and search for new truth which may focus light on the problems which face you in the classroom and laboratory. As has been said, "He who dares to teach must never cease to learn," so . . .

Study

Modern industrial life has its leaders. They are, in the great majority of cases, capable men who possess capacity for learning, by virtue of which they may become increasingly capable. True, there are those who have skyrocketed to fame and fortune and to positions of great responsibility, riding thereto on the phantom of the *breaks* or climbing up on strings held from above by the friend or relative who at the moment occupies the throne, before which such a climber must continually prostrate himself in homage, giving thanks to him who had the power to give the special favors. More often, the man at the top is one who knows his job, very often having come up through the ranks and often having been placed in the position after long and arduous years of study and research. The man who succeeds is often the man who worked while his now less fortunate brother slept. He burned the midnight oil at the foot of the altar of knowledge instead of wasting it in the torch of dissipation. Down through the ages the world has honored and respected those who have known the answers to the pertinent questions of living, and those who have had such knowledge have become the leaders of men. Therefore, if you would succeed, if you would *proceed according to plan,* plan now to . . .

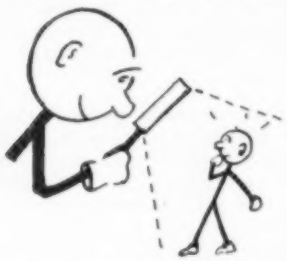
Become a Leader

We all know those who are called *natural* leaders, those who seem to be able to get along with anyone and everyone no matter what the circumstances. However, psychologists and others who have studied the science of human relationships, say that leadership is a virtue which can be developed, and developed well by the average run-of-the-mill man or woman. It calls for strict and unflinching adherence to certain rules of conduct which can be learned. It calls for study and thought and constant attention to certain specific details which many of us overlook in the hustle and bustle of modern living. It calls for consideration of others and for giving as well as taking. It calls for expression of one's views and opinions, and for the courage and fortitude to consider the other fellow's point of view in all things, for the humility necessary to admit error of thought or action. The real leader is the servant of those he leads; he is one upon whom others can depend for guidance; he is the man who devotes much of his life to his fellow men. The greatest leader of all decreed that the man who would lose his life for others would find it, and He exemplified His

philosophy in every word and deed. So study the lives of great leaders to learn how they gained their success. Study the writings of *experts* in the field and learn what they have to say regarding the acquisition of leadership ability. Associate with leaders whenever possible, and profit by their experiences. This can best be done if you . . .

Choose Your Associates

This does not mean that you are to become a snob, one who refuses to associate with the average man; for life would, under such circumstances, become a sham, a farce, a drama in which the ordinary man who is usually the *salt of the earth* would be denied entrance upon the stage. It does



mean, however, that in studying men one should rather than avoiding those of rank and ability, strive to know them better through closer association and normal contact. It may be necessary at times to push one's self into the picture by sheer force of will, to overcome the natural tendency to retire to the sidelines and wait for future developments. It requires constant effort to observe at close range the actions and thoughts and spoken words of those whom one would choose as models, and this can best be done by planned and carefully, tactfully executed maneuvers of human relationships which make it possible for the student to become closely associated with successful people. Certainly, you will make mistakes in attempting to make such contacts. You may even suffer embarrassment and chagrin, but never defeat, if you . . .

Profit by Your Mistakes

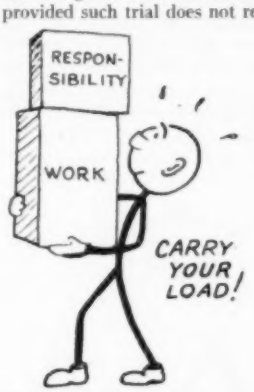
Everyone makes them. No man has lived without making some. They are part of life, part of living, part of education, part of experience. They are the tools of yesterday with which we build our world of tomorrow. They are the unexpected, the uninvited guests which show up — sometimes at strategic moments — to teach us to think in advance of our actions and to emphasize the value of planning our work. Mistakes are often very costly, but those who make them can offset much of the damage done by making them valuable as texts and references to be placed on call in our library of experiences, never to collect dust as a result of non-use. Such valuable volumes cannot be purchased with gold or silver, but can only be obtained by the medium of exchange which is counted in terms of sleepless nights, days full of worry, graying hair, and regret. The important lesson to be learned from mistakes made is that such actions and circumstances as led up to the mistakes must be studied and remembered. One must listen to the voice of his own experience and must remember what it says. One must learn that others have problems, too, and that others too make mistakes, which, as your own, can prove to be valuable guides for the future conduct of yourself and others. So, to profit by mistakes, you must . . .

Learn to Listen, and Listen to Learn

In developing leadership, in knowing your job, in studying others one must learn to listen. Listening in the true sense is not just opening your ears to the words and sounds which emanate from the mouths of men. It is thoughtful participation in their thinking, and concentration on and study of the words being spoken. In our associations with leaders we must listen to what they say, or our presence with them may appear to the observer to be an attempt at social climbing rather than a planned method of gaining knowledge. To participate in a conversation with others and to disregard what is being said while you lay plans for your next sentence is an ideal way to insult your comrades while displaying your utter disregard for their point of view. Perhaps that is why Henry David Thoreau, as he says in his classic "Walden," sometimes felt cramped in his small cabin on Walden Pond. He wrote: "One inconvenience I sometimes experienced in so small a house, the difficulty of getting to a sufficient distance from my guest when we began to utter the big thoughts in big words. You want room for your thoughts to get into sailing trim and run a course or two before they make their port. The bullet of your thought must have overcome its lateral and ricochet motion and fallen into its last and steady course before it reaches the ears of the hearer, else it may plow out again and through the side of his head." Thoreau was a good listener as well as a good speaker. He had little respect for those who would not listen in the true sense of the word, and just as little respect for those who could not weigh their words on the balance of value before giving utterance to them. Learn to listen, and listen to learn, and by making use of the knowledge so gained . . .

Be an Efficient Worker

No organization in its travels through modern life is looking for excess baggage to carry, since they usually load themselves down with problems which are vitally necessary to the conduct of their business. Therefore, as a part of an organization, each of us should strive to trim ourselves to the lines of efficient operation, no matter what our responsibilities might be. If we know our jobs we should be able to learn more efficient methods of doing them. Every employer who is progressive and interested in his own welfare will welcome suggestions as to better ways of doing a given task. Better methods of teaching should be given consideration as they are developed by those with vast experience, and should be given a fair trial in the classroom provided such trial does not result in



the exploitation of the students concerned. Industries throughout the world are spending huge sums of money in an attempt to develop efficiency on the job; education, in many parts of our country, is still following the patterns developed centuries ago, for better or for worse. This does not mean that that which is new is always good, for nothing could be farther from the truth. However, new ideas, new systems, new methods should be seriously studied before being cast off, for someone else may find them and greatly profit thereby. So develop efficiency, and in so doing . . .

Go One Step Farther Than Necessary

The average man works eight hours for eight hours' pay. The above average man will put in a little extra time occasionally to accomplish some task which is important enough to warrant excessive effort. The average man does the job as he is told to do it, whether he thinks it is right or not; the efficient man may figure out a way to convince his superior that a better method can be used. The average man walks the proverbial mile, the man-on-his-toes goes twain. Take on more work than the minimum required, and do it well. Volunteer for extra service if you can possibly spare the time; your attitude and loyalty will be recognized and you will gain the respect of

your superiors. One need not be a martyr if so doing, nor need one sacrifice his self-respect by being the *goat*. Stand up for your rights and for the rights of others about you and *your name shall be known for good among men.*

Proceed — according to plan. Make your plans for progress, for a better job, for higher wages and salaries, for more and better consideration on the part of your superiors. Plan to advance, to move ahead, to attain new goals by:

1. Knowing What You Want
2. Knowing Your Own Job
3. Studying
4. Becoming a Leader
5. Choosing Your Associates
6. Profiting by Your Mistakes
7. Learning to Listen and Listening to Learn
8. Being an Efficient Worker
9. Going One Step Farther Than Necessary
10. Being Co-operative in every way.

Shop Personnel Organization

BRUCE J. GAMMONS
Woodshop Instructor
High School
Pacific Grove, Calif.

Personnel organization in the management of a school shop has long presented a problem to industrial-arts instructors. There are several necessary and desirable attributes of a successful organization.

1. It must be democratic in principle and function.
2. It must relieve the instructor of the myriad of managerial duties which do not allow him to teach.
3. It must evolve out of and meet the needs of a specific situation.
4. It must be tried out and altered until it functions efficiently in the given situation.
5. It must be of educational value to the students to justify its existence.

The personnel organization herein outlined has been used in the woodshop of the high school at Pacific Grove, Calif., and has proved successful enough to warrant passing it on for the consideration of others. Figure 1 shows the organizational chart which was devised.

This organization is set up at the beginning of the school year. Careful orientation is necessary to build up the right attitude toward it. Otherwise, some students may think it humorous to vote a boy into a foremanship without consideration of his qualifications. Students should be shown how the organization will function in promoting safety, making for a more efficient shop, giving them greater opportunity; and they should be impressed with the need for individual responsibility and for each individual to clean up after himself in order that a shop of this type may function with greatest opportunity for all.

The organization is basically democratic in that the five foremen are elected by the class to serve for a four-week term. The other students are given shop responsibilities by placing their names in alphabetical order on the responsibility chart shown in Figure 2.

These names are moved weekly by the shop foreman who moves each name down and the bottom one to the top. When new foremen are elected the outgoing foremen take their places on the responsibility chart. It is the accepted policy not to elect any boy to the same foremanship more than once — thus giving as many as possible an opportunity to have the experience.

The organization may be further broken down so that each of the four foremen under the shop foreman has several students under his direction, particularly during the five-minute cleanup period at the end of the period. During this five-minute cleanup time every boy has a responsibility to perform. The responsibilities are listed on the bulletin board and explanation given as to just what is expected. Each foreman receives a written list of functions he should perform and verbal instructions as needed. Each foreman also receives a specific grade for his job as foreman on the grading chart. The performance of respon-

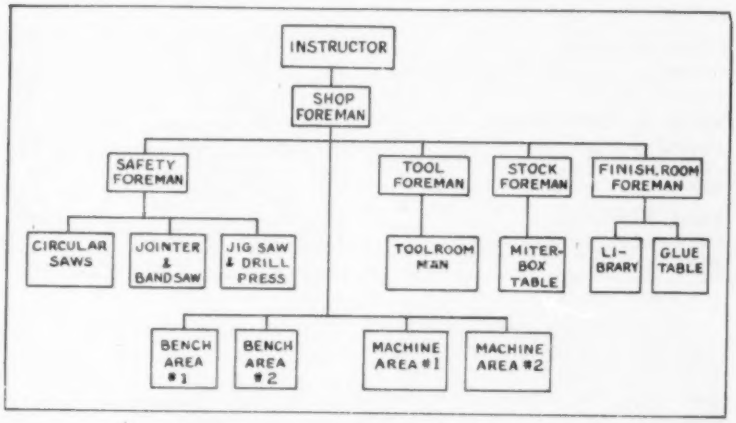


Fig. 1. Shop-personnel organization chart

Fig. 2. Responsibility chart

sibilities enters into the grading of all shop students.

The establishment of this organization has made a tremendous difference in our shop. The standard of workmanship has gone up, the attitude of the boys, as well as the general appearance of the shop has improved, the instructor has more time for actual teaching, it has given impetus to the observance of safety factors, the boys are much more willing, and the entire atmosphere is more conducive to learning, more cheerful, and more co-operative.

In conclusion, it must be re-emphasized that the sucess of such a shop organization is dependent upon the existence of or development of the right attitude toward it. There also must be continuous, conscious effort on the part of the instructor to maintain this attitude. Furthermore, the boys will respond to responsibility if it is presented to them as their shop, their problem, and their opportunity. However, too much responsibility must not be thrust upon them at once or it will meet with failure. The teaching of accepting responsibility is an educative process and must follow sound principles of education. This organization does not operate with perfection. We are dealing with an evolving learning situation and no organization could be expected to operate perfectly in such a situation; if it did then the opportunity for teaching would not be present. Not only does this type of organization present a better learning situation and allow maximum development of skill by more boys; it also makes possible the teaching of the idea of democratic responsibility. This, in the opinion of the writer, is more important than teaching technical skill in a high school shop.

NOTE: The responsibility chart may be made of ¼-in. plywood. The names may be printed with India ink on heavy drawing paper and hung on hooks or 2d finishing nails. It has been found that having his name up in big letters is quite a psychological stimulus to many a boy. Of course, it also makes possible a quick checkup on who has neglected to live up to an assigned responsibility.

Public Relations and Vocational Education

LYNN OGDEN
Director of Vocational Education
Augusta, Ga.

KURT A. SCHNEIDER
Director of Vocational and Adult Education
Richmond, Va.

EARL KIMBALL
Director of Industrial Education
Waterloo, Iowa

The value of public relations is recognized today by business enterprises everywhere. The success of any enterprise depends in a large measure, other things being equal, on the quality of its public relations. It is not enough that public relations be good — they must be the best. Management appropriates freely large sums for that purpose.

Public relations has been defined as "the interchange of good will between a private interest and a public interest." The private interest strives to serve the public interest well, and is rewarded with understanding approval and support. Such a relationship, though intangible, is an asset which has cash value in the business world.

On the other hand, when a public institution is set up to serve the public, good will is often taken for granted. Through the years, the public school has paid little attention to promoting good will among its patrons. Administrators today are loathe to spend any considerable amount of time or money in promoting a better understanding of the aims and objectives of education.

Educational offerings of today are greater in number than ever before. The whole concept of education has changed since the turn of the century. At the present time educational opportunities are provided in many places for "all who wish to learn" from preschool to old age. Educators are continually seeking to meet public needs. The good will of the public is essential to the success of these efforts.

Vocational education, in particular, depends on good public relations. Co-operative relationships between industry, the school, and the public are based on good will. Every administrator of vocational education is concerned about making the

PUBLICS \ MEDIA	Newspaper news items	Newspaper features	Newspaper advertising	Radio	Motion pictures	Slides and films strips	Casual posters	Car cards	Billboards	Handbills	Circular letters	Personal letters	Organized mail campaign	School catalog	Periodic school bulletins	School picture posters	School picture postcards	School publications	Open house	Dramatics	Student organizations	Exhibits in school	Exhibits in town	Word of mouth	Lectures	Speeches	Luncheons	Dinners	Women's organizations	Advisory committees	Civic organizations	Business organizations	Labor organizations
Prospective students	4	4	4	3	4	4	3	3	2	3	3	4	3	4	4	3	3	3	3	3	4	3	4	5	2	2	1	1	4	4	3	4	3
Employers	4	4	3	2	2	2	2	3	2	1	2	5	3	1	1	2	2	1	2	2	2	2	3	5	2	3	5	5	3	4	3	3	1
Teachers	3	4	2	2	4	4	3	4	2	2	1	3	2	3	4	3	3	4	4	5	3	5	4	5	3	3	4	4	3	3	4	4	2
School children	4	4	2	2	4	4	3	3	3	2	0	0	0	2	3	4	4	5	4	4	4	4	4	5	1	1	0	0	0	0	3	3	0
Out-of-school youth	4	4	4	3	2	2	3	4	3	2	3	5	4	2	1	3	3	2	3	3	3	3	3	4	5	1	1	0	0	2	3	2	3	3
Adults	5	5	4	5	4	1	4	4	4	2	3	4	3	3	1	3	3	1	4	4	2	4	4	5	3	3	3	3	3	2	3	3	3
Administrators	4	4	2	3	2	2	3	3	3	1	1	4	1	4	3	3	3	3	2	2	2	2	2	5	3	3	5	5	4	4	4	3	2
Parents	5	5	4	5	3	2	3	4	3	2	3	4	3	2	2	3	3	4	4	4	4	4	4	5	3	3	2	2	4	2	3	3	3
General public	5	5	4	5	4	1	4	4	4	2	3	1	3	1	1	3	3	1	4	4	2	4	4	1	3	3	0	0	3	2	3	3	3
Women's organizations	0	0	0	1	4	3	0	0	0	1	3	4	3	1	3	0	0	1	3	4	–	3	0	1	5	5	4	4	–	–	–	–	–	–
Advisory committees	0	0	0	1	4	3	0	0	0	1	1	4	3	2	3	0	0	1	3	2	–	3	2	1	3	3	5	5	–	–	–	–	–	–
Civic organizations	0	0	0	1	4	3	0	0	0	3	0	4	3	0	3	0	0	1	3	4	–	3	2	1	5	5	5	5	–	–	–	–	–	–
Business organizations	0	0	0	1	4	3	0	0	0	3	0	4	3	0	3	0	0	1	3	4	–	3	2	1	5	5	5	5	–	–	–	–	–	–
Labor organizations	0	0	0	1	4	3	0	0	0	3	1	4	3	0	3	0	0	1	2	2	–	2	2	1	5	5	5	5	–	–	–	–	–	–
Student organizations	0	0	0	1	4	4	0	0	0	2	1	1	1	3	4	3	3	4	4	4	–	5	4	1	5	5	5	3	–	–	–	–	–	–

Ratings: 5 — Superior, 4 — Excellent, 3 — Good, 2 — Satisfactory, 1 — Not recommended, 0 — Do not apply.

Note: Organizations are Media or Publics.

public relations surrounding his training program the best possible.

Publicity plays an important part in establishing and maintaining good public relations. The good will of the public is like a rolling snowball in the broad outreach of its benefits. When the need can be shown through good publicity, good will provides needed funds for new buildings, broader offerings, more equipment, and better teachers. More students are enrolled and a higher educational level is attained. New residents and new industries are attracted by the increased training facilities. The result is a larger, wealthier community and state and national recognition. The increased training facilities mean greater economic security for citizens, which brings greater happiness to more people.

The public is composed of individuals and groups of individuals who are sometimes spoken of as "publics." Publicity attempts to reach them through a variety of media. The analysis on page 274 is a study of various forms of publicity in relation to "publics" with a view to indicating their comparative effectiveness.

It should be noted that cost of publicity does not enter into this analysis, and that the effectiveness ratings are the composite judgment of the members of this committee, based on their own experience.

This analysis is presented in the belief that it will be interesting and useful to vocational educators in dealing with problems in public relations.

Recognizing the Value of Driver Education

DR. HERBERT J. STACK
Director, Center for Safety Education
New York University
New York, N. Y.

By long experience and more recently by close analysis we know that the most dangerous single factor contributing to the annual traffic death rate on our streets and highways is *mental attitude*. Carelessness and deliberate chance-taking have been the primary factors in the needless slaughter which last year accounted for 34,000 dead and over a million injured.

The realization that an automobile, even at its best, is a fast, powerful, inanimate machine guided only by the judgment and control of the man behind the wheel is proof enough that traffic accidents are as preventable as the individual driver wants — or knows how — to make them.

It naturally follows, then, since *mental attitude* heads the list of motivating forces behind accidents, that a sound basic education on how to drive an automobile is the very essence of highway safety. Such knowledge provides a long-range solution to the problems of the annual traffic death toll by developing a new and safer kind of automobile driver.

Educators and accident prevention specialists who have studied the approaches to this solution maintain that the high school driver education course is the most effective answer. To teach the high school student safe driving practices and a sane attitude toward safety in general at the time just previous to his reaching the legal driving age is sound logic and is a long step toward avoiding unnecessary accidents.

One national accident prevention organization recently put the value of driver education into clear focus by announcing a plan to reward the states which maintain and expand sound safe-driving programs.

The educators and safety experts have several interesting facts to work with. At least three out of every five high school students will be either driving an automobile at graduation or within three years thereafter. One million new teen-age drivers take to the highway every year. The proportion of drivers involved in accidents is highest in the teen-age group and, basing statistics on mileage, teen-age drivers have the highest accident rate.

As may be surmised from these few points, not only is it logical to teach driver education to youth just as they get behind the wheel because they are in the formative years when sound safety habits can be established, but the fact remains also that during this period these young drivers are more accident prone than at any other time in their lives. Thus, high school driver education serves a twofold purpose: It develops a firm foundation of safety habits which will carry through to safer, better living in later years, and, in addition, it serves as an on-the-spot accident prevention measure at a time when the student is most likely to have accidents.

Much has already been done to establish and expand safe-driving instruction in secondary schools. A great deal more remains to be done. In 1946 more than 5000 high schools, only about one fourth of the public high schools of the nation, had some type of driver education. But the number of schools offering the courses is steadily increasing.

For the purpose of clarifying *driver education courses*, it should be pointed out that such courses are those where organized classroom instruction is given, using a textbook devoted exclusively to traffic safety education, and following an organized syllabus of study. To be more complete and effective such instruction should include or be followed by actual *behind-the-wheel* instruction. This actual road work is not absolutely necessary, however.

Most educators interested in these courses feel that the ideal program should include 30 hours of instruction, but as few as 20 hours of instruction can constitute a course and still attain the desired goal.

Behind-the-wheel instruction is the most difficult part of a driver education course for the schools to maintain. First there must be considered the purchase and maintenance cost of instruction cars. Secondly, such necessarily *off-campus* instruction is sometimes difficult to arrange with limited teaching staffs.

Hence, in many cases these difficulties have led school boards or high school principals to shy away from driver education courses. Some high school administrators feel that unless road instruction is given the classroom course is worthless and, being unable to arrange the road instruction, do not include any driver education in their curriculums at all. Fortunately, however, many other administrators have taken the view that safety instruction of any kind is of some advantage and have included good classroom driver education courses in their schedule.

It should not be construed that small schools cannot have behind-the-wheel instruction. Several states now encourage *home supervision plans* wherein parents or interested adults who own automobiles volunteer their time and the use of their cars to help the students with actual driving practice. A notable example is at the high school at Abington, Mass., where parents are invited to meet with the principal and the instructor at the beginning of each new course. The principles and the need for such driving instruction are outlined and the parents sign up to help with the road instruction. Principal Charles Frolio, originator of the Abington Plan, feels this system has had notable success and points out that such home co-operation gives older persons, who may have relaxed their own driving habits, a refresher course in safe operation of an automobile while they are actually instructing their children and other students.

Abington is a town of a little more than 5000 population, yet its high school boasts a driver education course as complete as any large city high school can offer.

As for instructional material, several national safety organizations offer course outlines and special instructions for teachers who conduct or plan to conduct driver education courses. The outstanding textbook in the field is *Man and the Motor Car*, published by the National Conservation Bureau, accident prevention division of the Association of Casualty and Surety Companies. High schools scattered throughout 22 states now have driver education programs based on *Man and the Motor Car*. As a guide to road training for use by parents and friends co-operating with high schools, the Center for Safety Education at New York University and the National Conservation Bureau have jointly published a 38-page booklet called "Behind the Wheel."

The Bureau and Center also send special instructors all over the country to conduct training institutes for teachers who will offer such courses.

The benefit of driver education courses in high schools has been proved. Where schools have offered systematic courses, accidents have been materially reduced. A study of 3200 students in one city showed half as many accidents for those with driver instruction as for those without. Add to this the fact that the public is favorably impressed by such programs. In a nationwide survey reaching thousands of people it was found that 78 per cent were in favor of driver education in high schools. Sixty per cent favored actual road instruction.

But all this will not further reduce the huge annual traffic death toll unless state educational departments and state agencies concerned with motor vehicles and safety continue their efforts in behalf of high school driver education programs and materially expand them so they may reach the maximum number of students reaching legal driving age. One fourth of the high schools teaching safe driving is not enough. The other three fourths are needed as well.

Recognizing this problem, The National Conservation Bureau, in addition to its many efforts to expand safe driving programs, recently announced a plan for giving recognition to the men and agencies in each state who have worked to maintain high standards in present driver education programs and helped to increase the number of schools giving such instruction. This plan calls for a series of annual awards to be given to states which meet certain standards of achievement in the opinion of a board of judges drawn from national safety and educational organizations.

One award will be given to each state which maintains satisfactory driver education courses in one fourth of its high schools — public, parochial, and private — and enrolling one fourth of the eligible students. A second award will go to those states which maintain the courses in half their high schools and enroll half the eligible students.

But the most coveted award, one for "excellence of achievement," should give considerable impetus to the expansion of driver education programs, because it will be based upon program developments including everything from numerically increasing enrollment in the courses to the amount of co-operation given the schools by outside agencies. Here, through the efforts of state agencies and unofficial organizations, the safety efforts of the entire state will be recognized.

The efforts of colleges in each state to train teachers for high school safety courses will be considered by the judges as enhancing a state's eligibility for the achievement award. Administrators of drivers' licenses who encourage enrollment in driver education courses by waiving part of the driver's license examination for those who have completed the course will also be contributing to their states' eligibility. The activities contributing to and encouraging driver education are almost unlimited.

It will be interesting to see how many states qualify for the first awards when the National Conservation Bureau announces them at the close of the school year next spring. No matter how few or how many states do add stress to driver education, some progress will certainly be made.

If we could get all the high schools in the country to offer safe driving instruction to all students before graduation, in a few years we would have a greatly improved class of motorists on the highways. These trained drivers would be far more skillful than their elders, better informed and with better attitudes in regard to safe driving practices and the rules of the road. There is no doubt that the annual slaughter in traffic accidents would decline.

What has already been done by some states and communities can be done by all.

The Machinist's Hands

DR. WALDEMAR SCHWEISHEIMER
Rye, N. Y.

Hands in every occupation are the most important tools, they are irreplaceable. They must be in good, healthy, and efficient shape. Man's hand is a tool and a weapon. Man alone of all the living beings has a hand. All other animals, even the manlike apes, have a paw.

The hands of artisans and handicraft workers were the center of hygienic discussion and observation early in history. The changes which the worker's hand suffers under the permanent influence of mechanical, chemical, thermal (heat and cold) irritations, are numerous. Such changes are frequently characteristic of certain professions and occupations and they are regarded as professional stigmata or signs.

Callosities of the Hands

Callosities or calluses develop as a result of pressure and friction over a small or larger area of the hand, e.g., in a machinist whose hand is constantly pressing toward the metal part of a machine. Calluses are circumscribed patches of hard, thick skin. Actually the callosity is a form of protection of the body against harmful pressure by a tool or any hard object. The permanent pressure would injure important parts in the deeper layers of the hand; the developing callus represents a sort of protective dam that diminishes the strength of the pressure.

The founder of the science of industrial hygiene and occupational diseases, the Italian physician Bernardino Ramazzini, in his important work "Diseases of Workers," published in 1700, mentions particularities of certain workers. Prior to his time no special attention had been paid to the worker's hand. Ramazzini opened up an entirely new medical territory — the immense field of trade diseases. He questioned all kinds of workers as to their ailments and tried to know their work — at his period as well as today the only appropriate way to find out the actual causes of occupational diseases.

Excessive Perspiration

Excessive sweating of the hands (hyperidrosis) is an unpleasant handicap for the machinist whose hands are bound to hold tight and are supposed not to slip. There are many sweat glands in the skin of the hands, and they are particularly numerous on the palms of the hand. The sweat evaporates quickly — drawing heat from the skin — and consequently the hands feel cold and wet. Excessive perspiration is a distressing condition for the machinist as well as for any worker, and interferes sometimes with his usefulness, for his hands soil everything he touches.

The cause of the trouble may be some form of anemia or another general condition — or it may be a local condition of the skin. The knowledge that one's hands are cold and clammy may add to the embarrassment of some nervous persons. They are afraid of shaking hands with other people that this fear alone may produce excessive perspiration of the hands. Any nervous trouble or emotional upset tends to increase the secretion.

For the treatment of the condition usually stringent lotions and powders are used. Soaking the hands in hot water for a short time gives temporary relief. Recommended is a 1 per cent solution of formaldehyde (which however, is not tolerated by everyone) — or a 1 per cent solution of quinine and tannic acid in diluted alcohol or Eau de Cologne. Afterward a dusting powder which contains salicylic acid or benzoic acid may be applied to the hands. Domestic remedies are bathing the hands in a weak solution of vinegar or of aluminum compounds.

Chilblains

Chilblains and frostbites of the hands may prove a nuisance not only in winter but all year round. Gloves which are too tight, combined with cold weather or working in unheated rooms, are the cause of such disturbances. The chilblains look red or bluish and swollen. The main complaints of the sufferer are itching and burning sensations. The symptoms are more marked when there is a sudden change from a cold to a hot atmosphere.

It is a common method of treatment and prevention to harden the surface of chilblains with alcohol in some form. Recommended is immersing the chilblains once or twice a day in warm water, and then following with gentle friction with camphorated alcohol, and powdering with one part of salicylate or bismuth to nine parts of starch. Other local applications include iodine, ichthyol, peroxide of hydrogen, camomile tea, the old household remedy of boiled oak bark, and the use of heat in many forms.

Infections of the Hand

Industrial statistics have shown that infections of the hand form the major injuries which lead to partial and permanent disabilities. The machinist is exposed to small injuries which may become infected. As Sumner L. Koch states it: "The trivial hand injury, promptly and accurately cared for, goes on to rapid recovery; neglected it may result in serious infection." Injuries of the hand form the most common type of industrial accident, but serious infections of the hand are rare when there is proper medical care. Good first aid treatment consists in immediate application of a sterile dressing and nothing more. Siler stresses the fact that obviously the best treatment is prevention, and this is only attainable as the result of co-operation and the sharing of responsibility by the employer, the employee, and the doctor.

Furuncles and "Oil Pimples"

Most pustules on machinists' hands are not of dangerous origin, but are simple furuncles or boils. There is a superficial inflammatory tumor in the skin, due to an infection. The inflammation frequently starts from a sebaceous gland or a sweat gland or the shaft of a hair. It is usually due to inoculation with a germ of the staphylococcus group. These infections occur mainly on parts of the skin exposed to friction or injury. The diseased spot is red, hard, tender to the touch, and suppurating with formation of a central slough (core).

The furuncle may become very painful. In some days or a week the boil is *ripe*. The pustule ruptures, and the yellowish-white content is extruded or may be removed mechanically. A conglomeration of several confluent boils is called a carbuncle — a very painful and disturbing matter.

The general condition of a machinist may predispose to the infection, and uncleanliness or unhygienic working conditions surely have influence on its growth In all cases of boils and especially in extended general furunculosis it is necessary to examine the urine for sugar, as a diabetic condition favors the predisposition to furuncles.

"Oil pimples" at the hands of machinists are produced because oil in constant touch with the skin blocks the opening of the sweat glands and sebaceous glands. Infection also plays a part, but the germs causing the infection come rather from the worker's own skin than from the oil. Another source of skin troubles is the presence of small particles of metal in the oil with which machinists frequently are bound to work. Coming from cutting operations in which the oil is used, these particles accumulate on the skin and on cotton waste used py machinists to wipe the oil from their hands and arms. Germs present on the skin may enter the scratches caused by this practice and lead to infection. Proper care of the skin may prevent to a large extent such unpleasant incidents.

Mr. James Coulas, owner and pilot, is about to take off in his Stinson, five-passenger airplane that was rebuilt in the aviation shops by the students at the Chicago Vocational School

Problems and Projects

A WEEK-END CABIN

J. EDGAR RAY
Faculty Member
The Stout Institute
Menomonie, Wis.

The owner of this cabin wanted to design and build a year-round cabin on a lake or river in a heavily wooded section. The building was to be built of masonry — brick, stone, and concrete in order to make it fireproof, and also to serve as a practical problem for the writer's students, which would give them a job under actual working conditions.

The building was staked out on the banks of the Red Cedar River, Menomonie, Wis. The lower part of the building was designed to be used as a boathouse and for general storage. This part of the building was built of stone 16 in. thick, from the material that was blasted out of the rock in preparing the excavation. The over-all size of the boathouse was 14 by 22 ft. with a ceiling height of 7 ft., a 6-in. slab of reinforced concrete was cast over the walls flush with the outside face of the walls. This made an excellent foundation for the building.

A concrete floor of 4 in. was put in the boathouse. The galvanized tracks were salvaged from an old windmill in two 20-ft. lengths. The cradle that was to support the boat was made of the same material. It was supported on four lawn mower wheels. The hoist was made from a cream separator geared up to a drum and a large and small wheel which gave a ratio of about 17 to 1. A ¼-h.p. motor furnishes sufficient power to pull in a heavy boat and motor. The motor has a reversible switch which releases the cradle and lets the boat go out and when reversed pulls it in. A garage door of aluminum was installed because of moisture that affects a wooden door. The canopy door acts as a shed in case of rain and allows for a low ceiling. The four 8-in. port holes are needed for ventilation the year round. This is necessary because the boathouse is built into a bank of solid rock.

The concrete steps from the river up to the grade were made of precast concrete with two pieces of iron in each slab of 18 by 36 in. The slabs were set on two courses of brick so there was a 12-in. tread and a 6-in. riser. This makes a comfortable stairs for anyone. The purpose of doing this was to give the steps a chance to move when the frost is in the ground, and if necessary, they could be adjusted easily without fractures which often occur in a monolithic set of steps.

A beautiful location for the week-end cabin

The building above the boathouse, 13 ft. 6 in. by 29 ft. 3 in., is laid up in brick having 10-in. hollow walls tied together with rigid metal ties. The cavity wall is an economical wall which is warm in winter and cool in summer. It should be built so there is a clear space between the walls and with no mortar droppings that would transfer moisture from the outside wall to the inside wall. Copper tubes were inserted at the base of the wall so there could be some drainage if there should be any moisture. These seep holes were placed every 3 ft. around the building. Masonry cement mortar mix was used which makes a solid rugged wall when set and is waterproof. The joints were made a full ½ in. to take care of the various sizes of brick that were used to put up the building. Old fire brick were used on the inside walls. The joints on the inside and outside were rodded (a concave joint) which helps to give a good straight joint especially when several sizes of brick are used. The walls on the inside were left in the natural state with the exception of the bathroom and kitchen walls which were painted white.

A small bathroom and kitchenette of masonry were added to give the cabin a modern touch for easy and economical living. It is remarkable how convenient a place can be if it is small enough to eliminate much of the drudgery of housework. It is big enough for a party and just the right size for a couple or a small family who wishes to be quiet and enjoy the woods and the water.

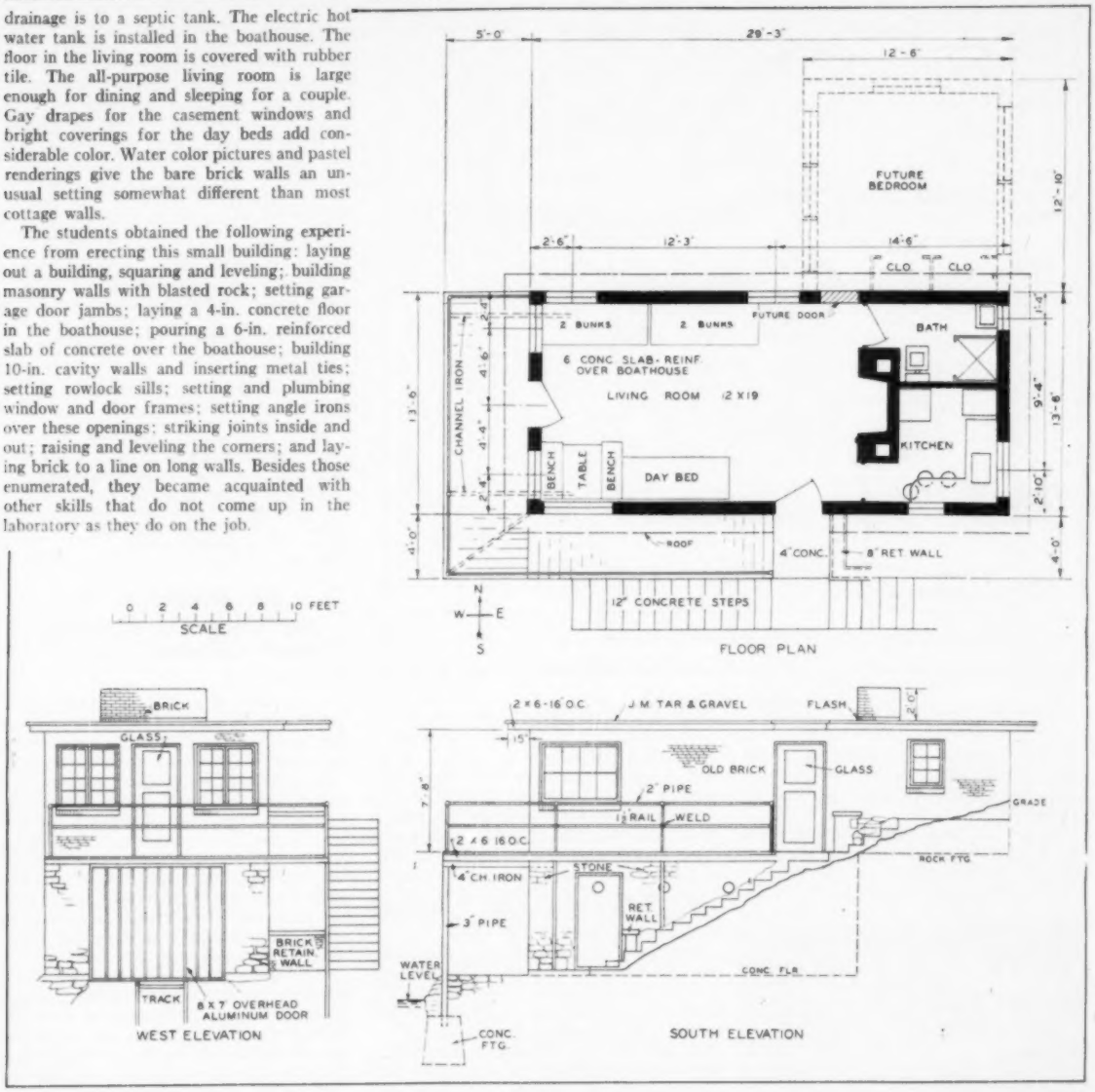
The cabin is located in virgin pines, which, in itself, is enough to give one a rest from his work, if needed. A week's vacation in a small place similar to this will do wonders for jangled nerves. The designer has made provisions for a small bedroom to be added next to the bathroom which will give future classes in building construction an opportunity to have some outside experience in actual working conditions, in the field, after their shop period is over.

The flat roof was chosen because of the design, and its economy. The ceiling joists of 2 by 6 in., were spaced 16 in., on centers with a piece of a 2 by 4 in. ripped diagonally and nailed to the 2 by 6's to give the roof a slight pitch. After the roof sheathing had been applied a ½-in. of insulation was nailed to the roof boards and a heavy tar paper roofing applied. This will give the roof ample strength in case of heavy snows which are frequent in Wisconsin.

Tile is laid in the bathroom and an asphalt tile floor in the kitchen. The accessories in the kitchen are of stainless steel with apartment size refrigerator and range. The water system is placed in the boathouse under pressure, and

drainage is to a septic tank. The electric hot water tank is installed in the boathouse. The floor in the living room is covered with rubber tile. The all-purpose living room is large enough for dining and sleeping for a couple. Gay drapes for the casement windows and bright coverings for the day beds add considerable color. Water color pictures and pastel renderings give the bare brick walls an unusual setting somewhat different than most cottage walls.

The students obtained the following experience from erecting this small building: laying out a building, squaring and leveling; building masonry walls with blasted rock; setting garage door jambs; laying a 4-in. concrete floor in the boathouse; pouring a 6-in. reinforced slab of concrete over the boathouse; building 10-in. cavity walls and inserting metal ties; setting rowlock sills; setting and plumbing window and door frames; setting angle irons over these openings; striking joints inside and out; raising and leveling the corners; and laying brick to a line on long walls. Besides those enumerated, they became acquainted with other skills that do not come up in the laboratory as they do on the job.



Details of week-end cabin

SHOE REPAIR IN RURAL AREAS

EVERETT A. GRANT
Industrial-Arts Department
Mariposa County High School
Mariposa, Calif.

Teachers of industrial arts are expected to adapt their courses to the demands of its clientele and of local demands, especially in rural areas.

In preparing shoes to be repaired, it should be recognized that there must be enough leather left on the shoe to hold the nails. Therefore, in the shoe having an inner sole and a wearing sole, a new sole should be put on over the old sole. This permits the student to do a neat job in this manner as the sole is to be nailed and not sewn. If, however, the shoe has an inner sole, filler sole, and wearing sole, as shown in Figure 1, the wearing sole is removed and the new sole is nailed in its place. The old sole is removed and the bevel is cut as shown in Figure 2.

The size of the new sole selected for the job should be the one that will allow for the least amount of waste. An extremely thick sole should not be put on a dress shoe or ladies' shoes.

The soles, if a *cut sole*, come in pairs and should be selected properly, remembering the smooth or hair side of the sole is the outside.

The new sole is held on the shoe in its proper place and an outline of the shoe is drawn on the sole using a soft pencil. At this time the tapered joint is cut to match that of the shoe. Leather is difficult to cut and dulls the knife rapidly. Therefore, sharpen the cutting knife frequently on a carborundum stone.

Leather soles will sometimes crack when flexed. It is necessary, therefore, to soak them in water for five minutes after they have been prepared for the shoe.

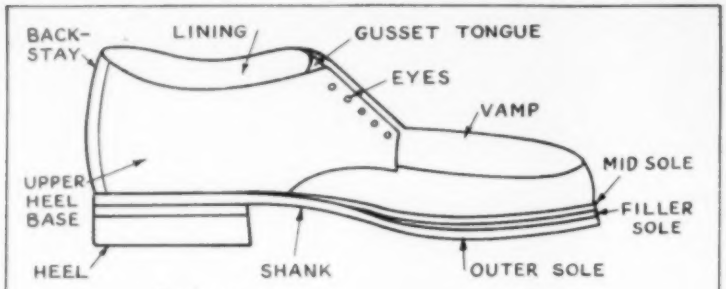


FIG. 1

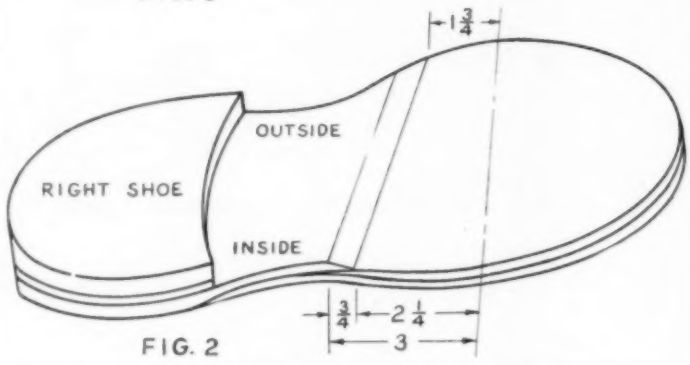


FIG. 2

Shoe repair in rural areas

An application of rubber cement should be applied to the portion of the shoe and new sole to be joined just before they are put together.

The shoe is placed upon the last using as large a last as will comfortably fit the shoe. The sole is first nailed along the joint. The size of the nail should be the thickness of the combined soles plus about 1/16 in. for clinching. Nails should be spaced about 3/8 in. apart.

After the sole has been nailed at the joint, the toe of the sole is held down by a nail being driven, not entirely through the shoe, but about 1 in. back of the toe.

A pegging awl is used to make holes to start the nails. Care should be taken not to make a hole too deep.

A hole is pegged. Then a nail is driven and clinched. A few nails are driven first on one side and then the other, alternating sides to help prevent the sole from gathering in the center.

When driving the nails, they should be held slightly toward the outside of the sole so that they are driven into the leather on an angle. If care is taken in spacing the nails, a good looking job will be done.

After the soles have been fastened, the excess leather is removed with a knife. The inside of the shoe should be inspected for nails that were not clinched.

A drum sander on a wood lathe simplifies the task of finishing the edges. If one is unobtainable a sharp wood rasp may be used. Care should be taken not to sand the shoe upper.

A shoe ink is used to color the new leather when it has been sanded. Either a black or a brown ink may be used depending on the color of the shoes. The ink is put on with a small brush and allowed to dry until it becomes a dull color. Then it is rubbed with a cloth until shiny.

Nails are furnished with rubber heels and the heels are put on very easily. The old rubber heels are removed or if leather heels are to be replaced with rubber heels, some of the leather layers are removed.

Rubber heels usually come in two styles, full heels and half heels. The full heels join directly to the shoe, whereas the half heel has a piece of leather or rubber filler between the heel and the shoe.

Select the size heel that will fit most closely. Place it on the shoe and nail, starting at the extreme back of the shoe. The nails are set down snugly in the heel with a nail set. When the heels are in place, they are finished in the same manner as the soles.

The students and their parents in our school have been greatly interested in this shoe repair course. The boys bring their brothers', sisters', parents', and friends' shoes to be repaired. The cost of soles and heels is 65 cents and a pair can be usually finished within a class period.

During the football season an interesting problem presented itself. A boy needing a pair of size 12 football shoes was unable to buy them at the sport shops. Cleats, built up of three pieces of leather to a size of 1/2 by 1/2 by 1 1/4 in., were nailed onto an old pair of ski shoes. These served very well, so that this student was able to play football.

LIST OF SUPPLIES

1/2 lb. clinch nails — sizes 3/8, 4/8, 4 1/2/8, 5/8, 6/8, 7/8
1 cobbler's hammer
1 cobbler's trimming knife
1 24-in. shoe last (three sizes)
1 8-in. medium carborundum stone
1 nail set
1/2 doz. small leather needles
1 ball bee's wax
1 ball Irish flax
1 pr. 8-in. end nippers
1 pr. 8-in. carpenter nippers
2 doz. pr. light men's cut soles
2 doz. pr. heavy men's cut soles
2 pc. (approximately 8 by 24-in. sole leather)
1/2 doz. pr. each — men's rubber full heels (9-9, 9-10, 10-10, 10-11, 11-12, 12-13)
1/2 doz. pr. each — men's rubber half heels (9-10, 10-10, 10-11, 11-11, 11-12, 12-12)
4 4-oz. bottles rubber cement

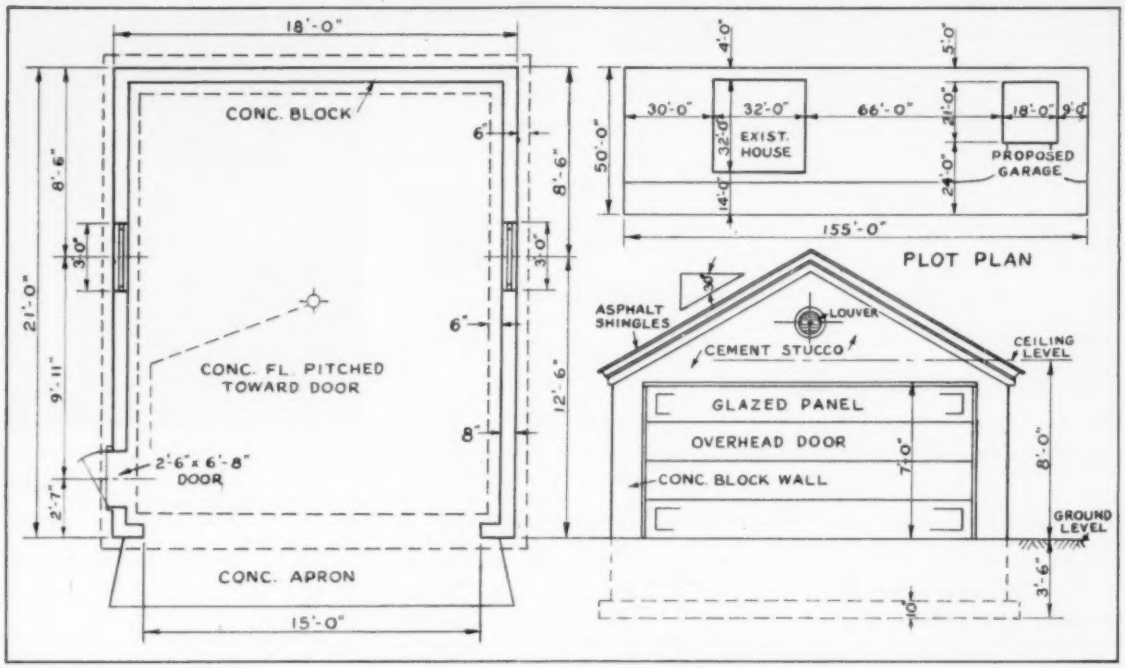
AN ADVENTURE IN ARCHITECTURAL DRAFTING

ANTHONY CALANDRO
Tuckahoe, N. Y.

As a student in a school of architecture I had to work on many a problem in architectural design. I got quite a bit of pleasure in the drawing and rendering of such problems as a public building entrance of classic proportions, a park shelter for an archaeological exhibit of ancient Greece, an artist's summer home, a church for a seaside resort, etc. However, in spite of everything, there was something lacking and it was not until I went into an architect's office that I discovered what it was. I had missed the thrill and pleasure of seeing the construction of something I had put down on paper.

As a teacher of architectural drawing at the Eastchester High School I have long realized the inadequacy of the course as it is set up. The varied problems are there but the chances for real life experiences are nil. I have considered visits to construction sites with the class but the curtailment of building because of high costs and lack of materials caused me to abandon that idea. However a few weeks ago a problem came up that was the answer to what has been troubling me. Hugo, a boy in class, requested assistance in the planning of a two-car garage that his father wanted to build on his property.

The entire class was assigned the problem, not as a competitive project but as a co-operative one. Several of the boys visited the office of the town building inspector to ascertain the side yard variances and zoning restrictions if any. Hugo told us that his father wanted a garage that would have outside measurements of 18 by 21 ft. and was to be of concrete



An adventure in architectural drafting

block construction with a coat of cement stucco. Some of the boys pointed out, and rightly so, that the garage would be entirely too narrow and that it would be a tight squeeze getting in and out of the parked cars. However the owner would not agree to a better proportioned design.

In addition to the floor plan and two elevations, a plot plan was required in order to show the side yard variances and also to show the proposed garage in relationship to the existing house. The drawing of the plot plan enabled the boys to learn the use of the engineer's scale.

Upon completion of the drawings we made blueprints on our school blueprint machine and then a couple of the boys took the plans to the building inspector. After a thorough examination he stamped his approval on one copy which was to be kept on the building site until completion of the job and another copy he kept for his records. He then issued a building permit upon the payment of a fee. Shortly thereafter the actual construction of the garage was under way.

Several visits have been paid to the construction site where many questions that had come up from time to time during the planning stage were cleared. Questions such as the reason for at least 12 in. clearance above the overhead garage doors, the need to give accurate data on the roof slope to assure faithful adherence to the design, the necessity for side yard measurements, the need for copious notes and dimensions for the benefit of the contractor (Hugo's father) and for taxation purposes, and the need for footings and their depth in this locality. Everyone in the class enjoyed the problem very much and it was evident from their reactions that they secretly felt like budding young architects. We are all looking forward to another problem of a similar nature.

DRAWING BOARD SUPPORT FOR THE WOODSHOP

CARLTON H. SHINDLER
Joint High School
Quarryville, Pa.

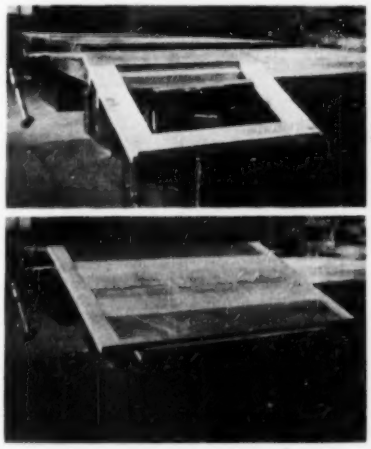
As it frequently happens, the general-shop instructor cannot advantageously teach mechanical drawing due to the lack of drawing board stands or holders, or the lack of space for their use in the school shop.

With this in mind, the drawing board holder shown herewith was designed. It requires a minimum of storage space when not in use, and is easily and quickly installed on a standard woodshop bench, when the woodshop area is converted into a mechanical drawing area.

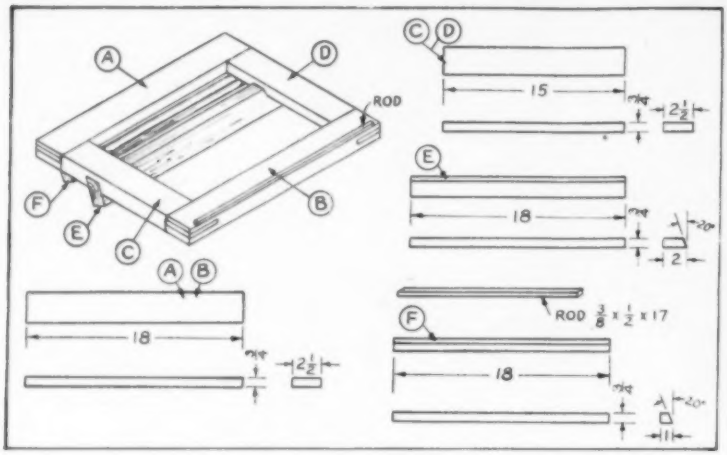
Since folding steel chairs are used, it was found that the most satisfactory angle for the drawing board for the average boy was 20 degrees. Item E, shown in the illustration, is held firmly by the jaws of the bench vice, while item F rests on the top of the bench, giving stability and rigidity to the frame.

The only disadvantage encountered in the use of this drawing board holder, is the inability to vary the angle of the drawing board.

Utilizing random pieces of scrap lumber, the entire project requires approximately 1½ board feet of lumber, a few nails and some cold glue. Through mortise-and-tenon joints were used for the frame construction. Item E was dadoed into the bottom, while item F was butted against the bottom of the frame. The *rod*, centered along the bottom edge of the



Drawing board support



Details of drawing board support

Fig. 1. Coffee table

frame, keeps the drawing board in place. Glue and finishing nails are used for fastening all parts and joints together.

COFFEE TABLE

FRANKLIN H. GOTTSHALL
Boyertown, Pa.

The carved brackets on the coffee table described in this article, add considerably to its beauty. They are not difficult to carve. Several of these tables have been made in the author's classes by students. On one, on which the wood was stained a walnut color, the brackets were colored green, red, and gold with gold bronze powders, blown on with an atomizer after the first coat of varnish had been applied, and while it was still sticky enough to hold the powder.

The table shown in Figure 1 was left unstained, but was given a coat of shellac and two coats of varnish. The last coat was rubbed down with pumice stone and oil. A hand-woven piece of cloth, placed under glass, makes an attractive top for this table, especially since the green thread used for the design goes nicely with the natural green and yellow colors of the poplar used to make the table.

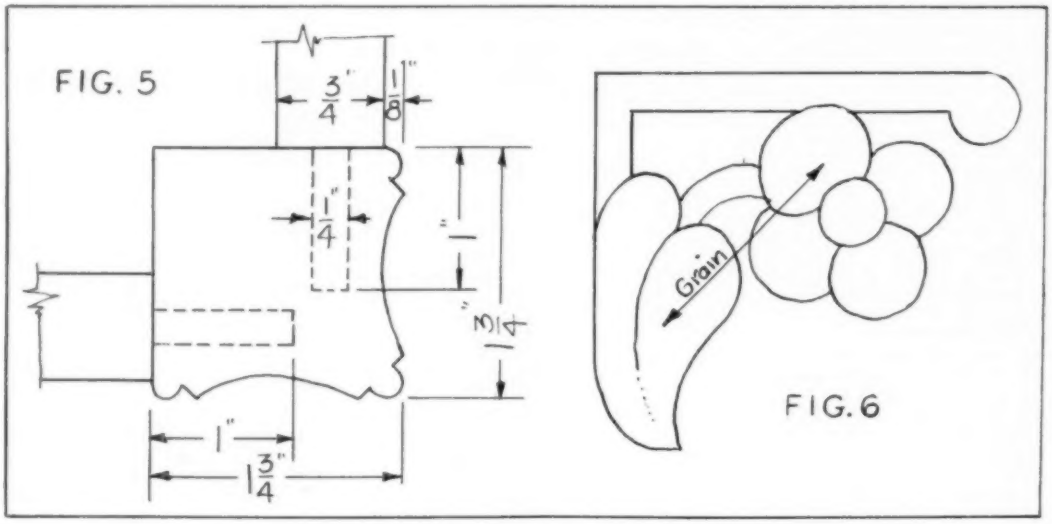
To Make the Coffee Table

First plane and square four legs to the sizes given in the bill of materials. Then mark the places where the mortises are to be cut. These may be cut either by hand or on the drill press with the proper attachments used for mortising. See mortising detail, Figure 5.

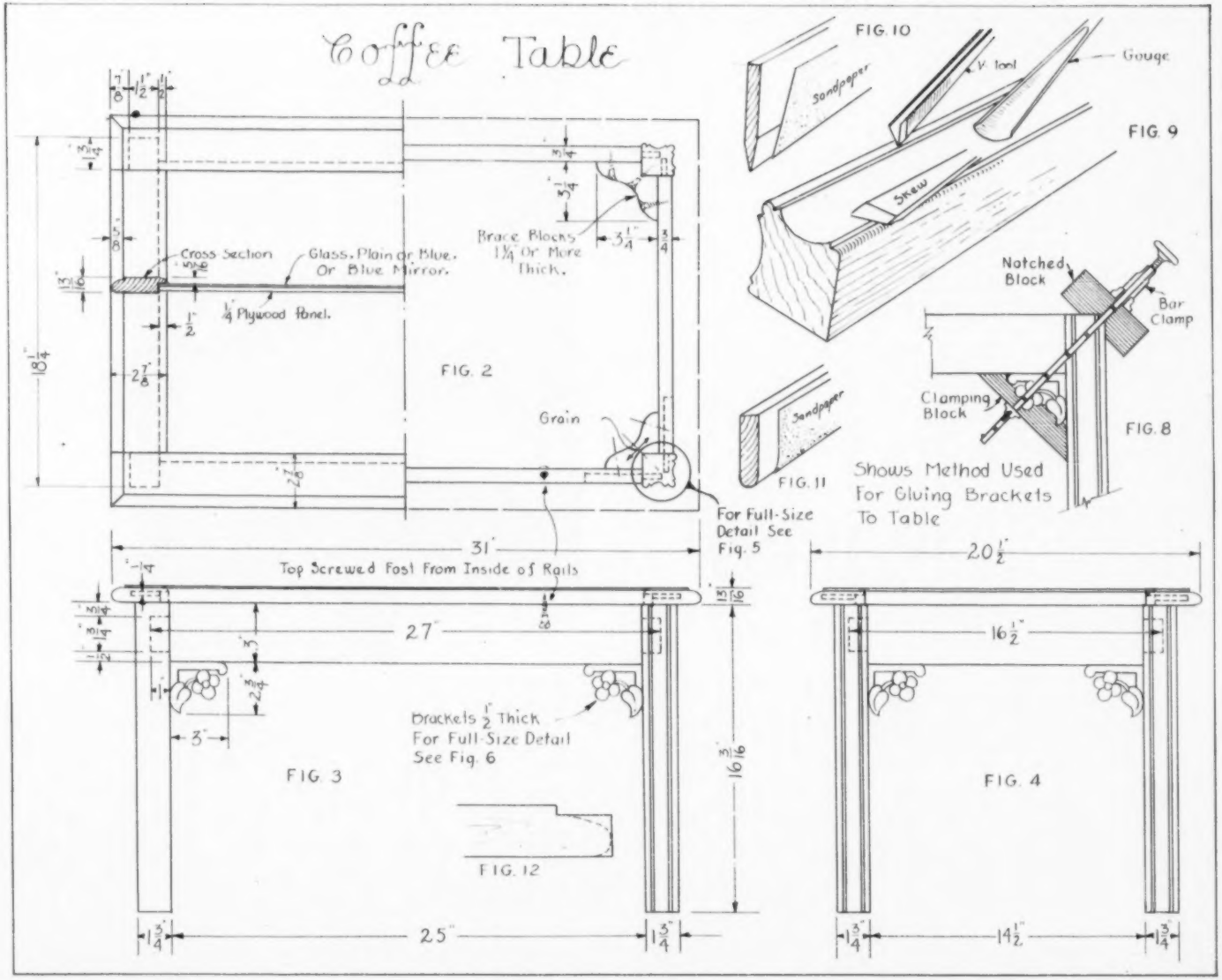
When the legs have been mortised they should be molded on two sides, as shown in Figure 5. If a full-sized cardboard template is made of the shape given in Figure 5, it may be used to trace the shape on the top and bottom of the leg. Lines connecting the sharp points, like those shown on three legs of Fig-

BILL OF MATERIALS

No. of pcs.	*Name*	*Size*
4	Legs	1¾ x 1¾ x 16⁵/₁₆ in.
2	Side stretchers	¾ x 3 x 27 in.
2	End stretchers	¾ x 3 x 16½ in.
8	Brackets	½ x 2¾ x 3 in.
2	Long rails for top	¹³/₁₆ x 2⅞ x 31 in.
2	Short rails for top	¹³/₁₆ x 2⅞ x 18¼ in.
4	Brace blocks for corners	1¼ x 3¼ x 3¼ in.
1	Plywood for top (Not needed if mirror is used)	¼ x 15¾ x 26¼ in.
1	Glass or mirror	15¾ x 26¼ in.



Details of corner and corner ornament



Details of coffee table by Franklin H. Gottshall

ures 3 and 4, may then be drawn. The molding may then be quickly carved by hand, by first using a wood carver's V tool for the V grooves; a shallow gouge to hollow the center section; and finally the heel of the skew chisel to round over the beading. These tools are shown in Figure 9. Once carved, the surfaces may be smoothed and the edges straightened with sandpaper. For the V grooves and beads use a sandpaper block shaped like the one shown in Figure 10. For the grooved part use a block shaped like the one shown in Figure 11.

After completing the legs, make the rails. Square and plane these to the sizes given in the bill of materials. Then lay out the tenons and cut and fit them to the mortises. Then glue the pieces you have made together, being sure to square the table while you are clamping the pieces together.

To make the carved brackets, plane a board, big enough to make all the brackets, to a thickness of ½ in. Then using a full-sized pattern traced from Figure 6, lay out eight brackets, being careful to have the grain of the wood lined up with the arrow in Figure 6, for you want no cross grain on any of the straight sides. Be sure in cutting the brackets to make the upper corner perfectly square. Cut the brackets to shape on the jig saw. Then carve them. Carving is not difficult. The leaf and stem are rounded over with the heel of the skew chisel. The petals of the blossom are hollowed out with the gouge, while the center of the flower is also rounded over with the skew chisel. Once the brackets have been cut out, carved, and sanded, they may be glued to the table, four at a time, by using properly shaped blocks and bar clamps, as shown in Figure 8. Shape the lower clamping blocks carefully to conform to the shape of the bracket, and don't make them too long, or the bracket cannot be pulled tight enough into the corner.

Once the brackets have been glued in place, make and fasten the brace blocks shown in Figure 2. These should be fastened with screws and glue.

Next make the top. Square and plane your lumber to the sizes given in the bill of materials. Make the mortise-and-tenon joints. The rabbet which must be cut around the inside of the frame to hold the glass, may be cut on the dado head on the variety saw either before or after assembling the pieces. In either case, a little must be left at each joint to be finished with a chisel after the frame has been assembled.

To make the molding around the outside edge of the frame, first cut a rabbet with the circular saw, or with a router, or a rabbet plane, as shown in Figure 12. Then round over the edges with a spokeshave, or plane, and sandpaper smooth. The lip on the inside of the frame is also rounded over with a spokeshave, and a chisel, and then sandpapered.

Drill holes on a slant through the rails to screw the top to the frame. Fastening the top to the frame is the final step in making the coffee table, once the finish has been applied and the glass put in.

INDIUM

Indium is a silver white metal which is gradually gaining more importance as one of the minor metals. While relatively high in cost very small quantities only are required to obtain interesting effects. Indium, while soft, is valued as a plating metal for jewelry and novelties because of its fine color and corrosion resistance — it is not easily oxidized. In spite of its softness small amounts of Indium will harden copper and lead alloys and increase their tensile strength. It is used in solders to improve "wetting" qualities and in low melting alloys to assist in lowering the melting point. One of the most interesting recent developments is the use of Indium in an alloy for soldering glass — used for sealing glass gauges and attaching contacts to glass. — *Belmont Metal of the Month, Brooklyn, N. Y.*

ALUMINUM CIGARETTE BOX

HOMER C. ROSE
Falls Church, Va.

The aluminum cigarette box, shown in Figure 1, is a useful container and a popular gift item. While the box was designed for cigarettes, it may also be used for holding stamps and other desk supplies, or as a jewelry box.

BILL OF MATERIAL

No. of pcs.	*Name*	*Material*	*Size*
1	Box	1/16-in. aluminum	4 x 5⅛
1	Cover	1/16-in. aluminum	3 x 3
1	Handle	½-in. aluminum	1⅜ x 15/8

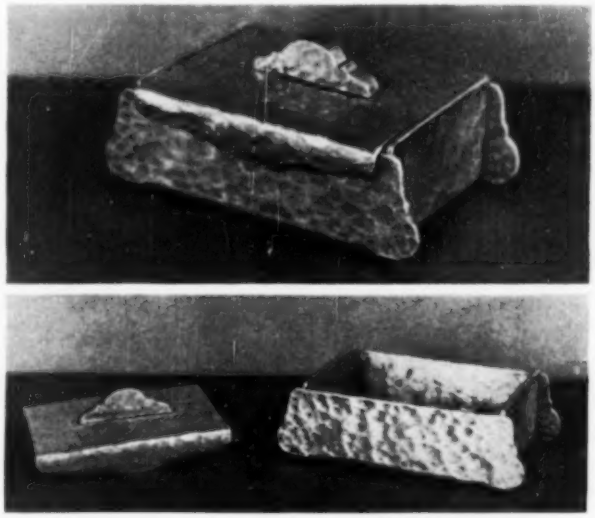


Fig. 1. Aluminum cigarette box

Suggested Procedure — Box

1. Make a layout of the box, cover, and handle on drawing paper.
2. Glue this to the aluminum with rubber cement.
3. Cut to the outside straight lines with tin snips or squaring shears.
4. Saw to the curved lines with jeweler's saw.
5. Finish curves with appropriate files. Jeweler's files are suggested. Keep files clean with fine wire brush.
6. Remove the paper and clean the metal.
7. Planish the surface of the metal with suitable planishing hammer and stake.

The planishing illustrated in Figure 1 is not very satisfactory as the hammer marks are not even and do not overlap each other. Great care should be taken to give the entire surface of the project the same planished appearance.

8. Bend the long sides of the box to 90 deg.

The bottom of the box should be clamped between smooth pieces of iron which have been covered with heavy paper. Hardwood may be used.

The stock should be clamped so that all of the metal used in the bends comes from the sides rather than from the bottom. Be sure that the sides of the box are exactly 90 deg. with the bottom. Use a mallet of wood, rawhide, or plastic to bend the metal.

9. Bend the ends to 90 deg., as in step 8.
10. Remove all burrs. Round corners slightly.

Cover

1. Cut the cover to size and planish as previously described in steps 1 through 7.
2. Locate and drill the hole for the screw used to fasten the handle. Two screws holding the handle are more desirable; however, one is satisfactory. A 10–24 screw is suggested.
3. Bend the sides as described in step 8, being careful to maintain the proper distance between the bends. The metal used in the bends must be taken from the sides rather than from the top of the cover.

Handle

1. Cut the handle to size and shape as desired with hack saw and files.

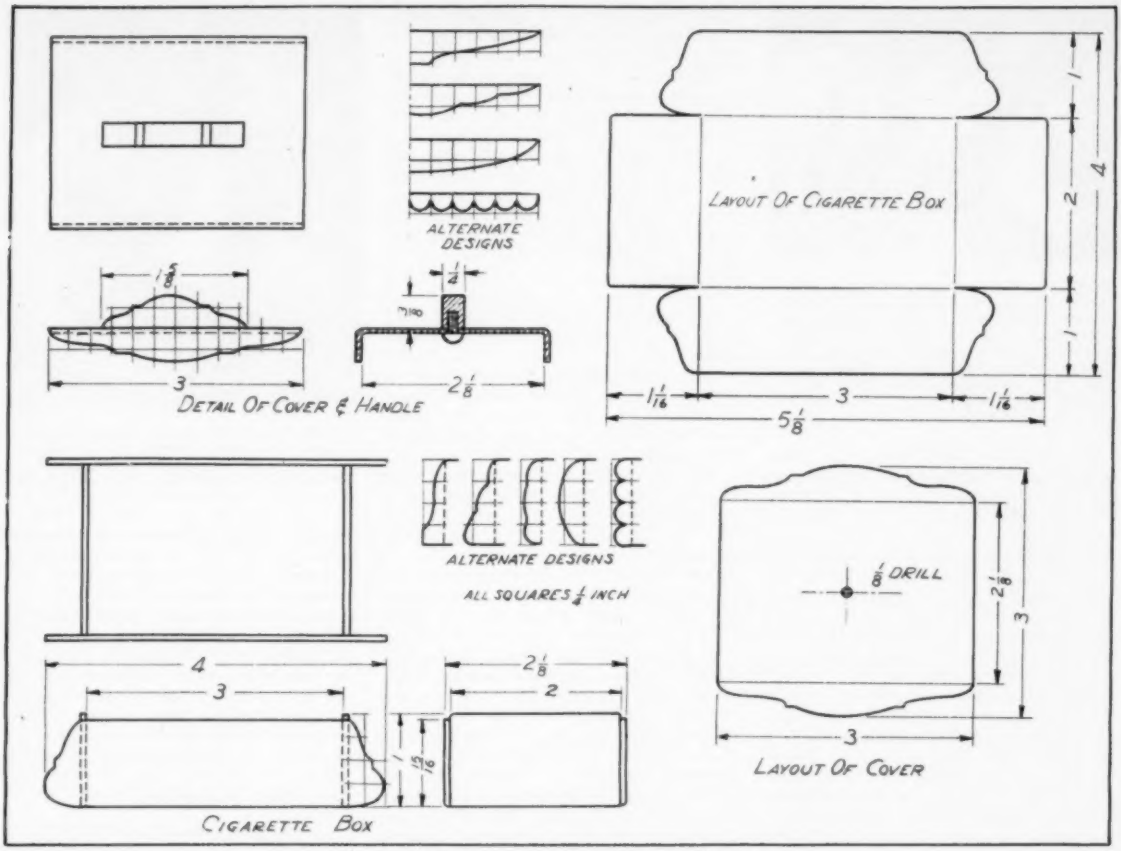


Fig. 2. Details of aluminum cigarette box

2. Planish the surfaces.
3. Drill and tap for the screw.
4. Assemble the handle and top.

Alternatives

The project may be made of hammered iron, brass, or copper.

A handle that can be riveted in place may be desired for ease of construction. In addition to handle designs shown in Figure 2 the following are suggested: a 1⅝-in. length of ½-in. tubing, a small cast animal, a simple scroll, a metal ball, or a ring.

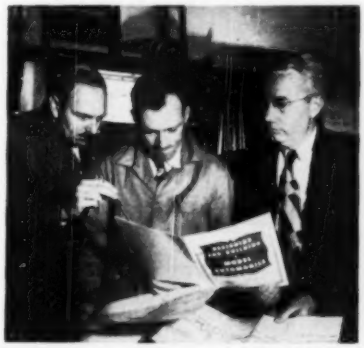
If the box is to be used for jewelry it may be lined with imitation or genuine leather, felt, or velvet.

The same design but with changed dimensions may be used for other small boxes.

CARS OF TOMORROW BY BOYS OF TODAY

BERNARD W. CRANDELL
Detroit, Mich.

A shop project in designing and building model automobiles, with a special incentive, has captured the imagination of youths in the senior and technical high schools of Elizabeth, N. J. This project receives the same credit as any other shop project, and is an outstanding feature of the school curriculum.



The manual on designing and building a model automobile is gone over by (left to right) J. Ely Van Hart, supervisor of industrial arts, Elizabeth, N. J., James Coleman, Jr., industrial-arts teacher, and Lehman C. Shugart, assistant superintendent of schools. A copy of this manual is sent to every boy who enrolls in the Fisher Body Craftsman's Guild

Shop bulletin boards are crammed with fancy pictures of new cars torn from magazine ads, and automobile sales literature, and many boys in the shop are working on their own ideas of what the motorcar of tomorrow should look like.

Students taking shop courses with elective projects have had, for the past two years, unusual interest in model car design and construction not only for its natural popular appeal but also because the completed model can be entered in the annual competition of the Fisher Body Craftsman's Guild, which offers a strong work stimulus with cash awards and university scholarships for the best examples of design and craftsmanship.

Two Elizabeth boys who had built their models at school, won awards in the New Jersey state competition in 1948. That was enough to start things rolling, and this year when the schools closed for the summer, it appeared that 20 of them would have completed model cars in time to meet the July 1 competition deadline.

A Washington Junior High School class, Elizabeth, N. J., gets some pointers from shop instructor George Hahn on model car design and construction. They are (left to right) Henry Shannon, Romonic, Paul Krzyston, and Jack Laskowich. The three stages of making a model car, from the modeling clay (left), to the plaster mold (right), to the finished product (center), are shown.

Many boys who originally enrolled in the guild, looked at their model car design plans and decided it was too difficult a project, or that they would rather build something else, soon had a change of heart, according to shop instructors. When fellow students got through the initial stages of model construction and applied the first coat of paint, the others were reinspired and picked up the project again. Those unable to finish their models for the 1949 competition probably will have a chance to complete them for 1950.

Shop instructors have welcomed the model car project because it includes work in several of the crafts as well as artistic design. The models are built either of wood or plaster, the first method calling for skilled woodworking, and the latter a casting process. In casting his model, a boy must first sculpture it in modeling clay, then make a mold either of liquid rubber, or plaster. Sanding, painting, making the wheels and trim, keep the model builder busy learning the use of hand tools and various phases of shopwork.

Shop instructors, most of whom made model cars themselves to learn the problems facing their classes, estimate that the project is roughly a 300-hour job. They found that seventh graders needed considerable guidance, especially in designing a model, but that the upper grade students had more perspective and could do a very creditable job by themselves.

Making model car design and construction a shop project in Elizabeth schools was the idea of J. Ely Van Hart, supervisor of industrial arts in the public school system.

"We have observed a continuing interest and enthusiasm in model cars as much as there is in building something practical like a lawn chair," Van Hart said. "They are an excellent test of a boy's imagination, ingenuity, and ability."

Van Hart bought materials such as balsa, plaster, cement, and paints in wholesale lots, selling them to the students at cost. This aided the project tremendously.

The plans and specifications for building a model car are provided free of charge by the Craftsman's Guild to all boys who enroll. These constitute the only textbook on automobile design for youth ever published.

Considerable public interest in the project was aroused last summer when the completed models were displayed in the showroom of the Union County Buick Co. This summer Van Hart is arranging to exhibit them again, just before they are shipped to Detroit for judging.

Van Hart has considerable personal interest in the model car project, for his son, David, won a third place award of $50 in the New Jersey state competition last year, and is back again this year with an even sleeker model.

Van Hart notes that all the boys develop their skill tremendously while building a model.

"You can't imagine the difference in a boy's skill between the first and second model he makes," Van Hart exclaims. "He knows what he is trying to do, and goes about it with confidence and much better technique."

With cash awards and university scholarships aggregating $65,000 offered as a goal by the Craftsman's Guild, it is understandable why the youthful craftsmen go back to "try, try again."

The Craftsman's Guild, an organization devoted to the development of craftsmanship and creative ability among boys, has given away almost $600,000 in awards and scholarships during its 19-year history. On the guild honorary board of judges are many famed scientists and engineers. These include Dr. Robert A. Millikan, of the California Institute of Technology; Dr. Ivan C. Crawford, dean of the University of Michigan College of Engineering; Dr. Karl T. Compton, chairman of the corporation, Massachusetts Institute of Technology, and chairman, Research and Development board of the National Military Establishment; Dr. M. L. Brittain, president emeritus, Georgia School of Technology; Dr. George J. Davis, Jr., dean emeritus, College of Engineering, University of Alabama; Harley J. Earl, vice-president and director of Styling Section, General Motors Corporation; Dr. Frederick L. Hovde, president, Purdue University; Charles F. Kettering, director, General Motors Corporation; Dr. Dexter S. Kimball, dean emeritus, College of Engineering, Cornell University; Dr. Harry S. Rogers, president, Polytechnic Institute of Brooklyn; and Rev. Thomas A. Steiner, C.S.C., formerly dean, College of Engineering, Notre Dame University.

On the advisory board are: Ernest C. Ball, superintendent of schools, Memphis, Tenn.; Arthur Dondineau, superintendent of public schools, Detroit, Mich.; Samuel E. Fleming, superintendent of public schools, Seattle, Wash.; Willard E. Goslin, superintendent of schools, Pasadena, Calif.; Herold C. Hunt, general superintendent of schools, Chicago, Ill.; Charles H. Lake, former consultant, board of education, Cleveland, Ohio, and Warren T. White, superintendent of schools, Dallas, Tex.

Judging of the model cars from all sections of the nation began in Detroit, July 7, and the state and regional winners were announced early in August. The 40 regional winners go to Detroit, expense-free, for the Guild convention late in August and there, at a testimonial banquet attended by leaders of the automobile industry, the board of judges and the advisory board, the boys hear the scholarship winners announced. The scholarships this year are two each in the amounts of $4,000, $3,000, $2,000, and $1,000, divided between the junior (12 through 15) and senior (16 through 19) age divisions of the competition.

Albert Fullerton, 16-year-old student at Edison Junior High School, Elizabeth, N. J., is striping in window moldings, on his model to be submitted in the Fisher Body Craftsman's Guild contest.

SILICON

One of the nonmetallic elements, Silicon may be obtained in three forms: amorphous, graphitoidal, and crystalline. Silicon is never found free in nature, but rather combined with oxygen as silica. It is used for deoxidation of molten metals, and to improve hardness and other physical properties. Belmont forms available: lumps, powder.

SILICON

Symbol	Si
Atomic number	14
Atomic weight	28.06
Specific gravity	2.40
Density (lb. cu. in.)	0.087
Melting point (o.f.)	2600
Boiling point (o.f.)	4147
Hardness	7.0 Mohs
Conductivity —	
Therman (% Ag)	20.6
Electrical (% Ag)	1.905 x 10–3

— *Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.*

About one out of seven of the deaths and injuries in traffic of youngsters 5 to 14 years old occur when the children are on bicycles. — *National Safety Council.*

FUNCTIONAL BEDROOM FURNITURE

E. J. RAWSON,
Head, Department of Industrial Arts
Northern Montana College
Havre, Mont.

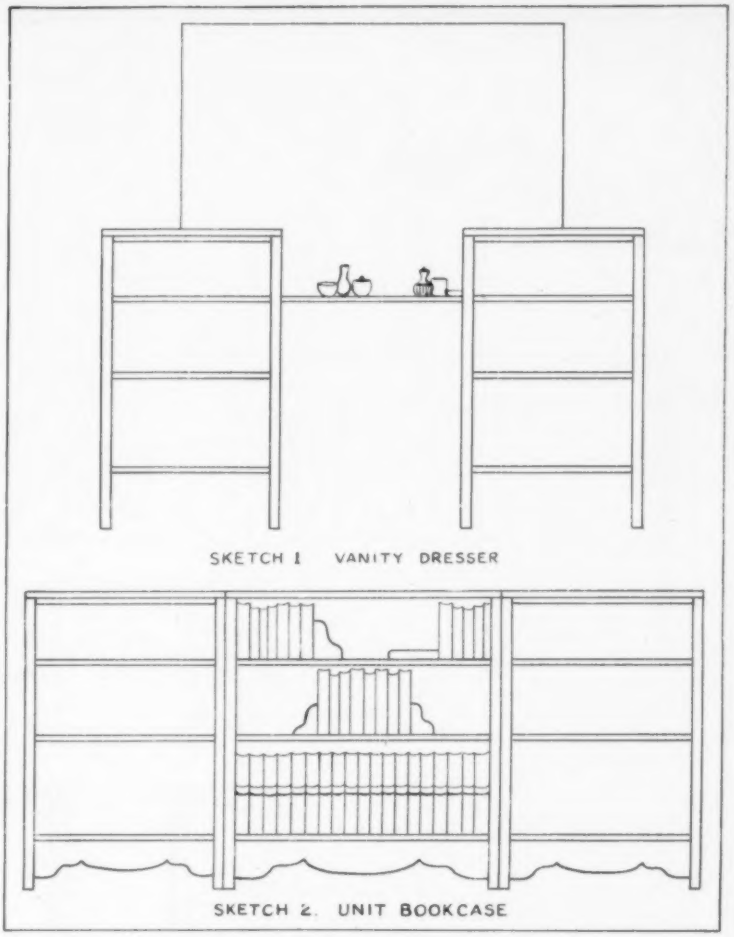
The functional bedroom suite herewith offers a project for advanced woodworking students in high school or college. It combines utility with a pleasing design which can be varied to meet individual needs.

The chests of drawers of this type were designed with several factors in mind. A considerable percentage of American people are not homeowners so the chests must be ever ready to fit into homes rented or owned. The two chests may be separated, a glass shelf placed in between, and the chests become a vanity dresser, as shown in Sketch No. 1. Two students designed a table and an upholstered stool to fit between two chests thereby making a vanity arrangement. If the bedroom isn't large enough to accommodate one or two chests they could be shifted to the dinette and used as a buffet or to the living room to become a part of a unit bookcase. See Sketch No. 2.

One space-conscious veteran designed the foot of his double bed to include the construction of two 11-in. drawers side by side. These drawers were near the floor and extended under the bed for a distance of 22 in.

The night stands on either side of the bed offer a convenient magazine and bookshelf with a drawer for storage. These may also be used on either side of the chests in a room which could not accommodate them as night stands. Again the night stands might function in the living room as lamp stands or book cases.

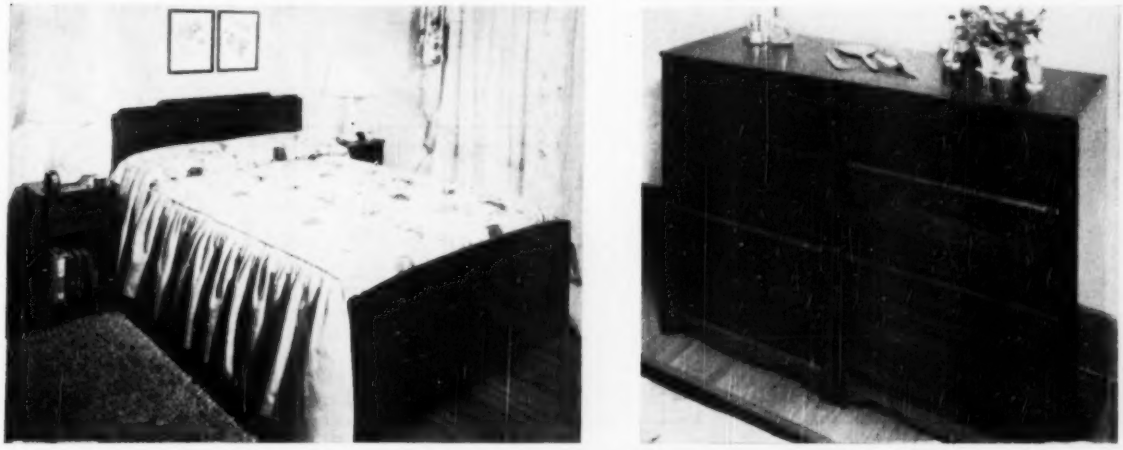
Since the bedroom suite was used as an advanced woodworking unit it is suggested that the students make out the bill of material and procedure steps and submit these for the instructor's approval. A few students may wish to alter the design or type of construction before submitting the plans for approval.



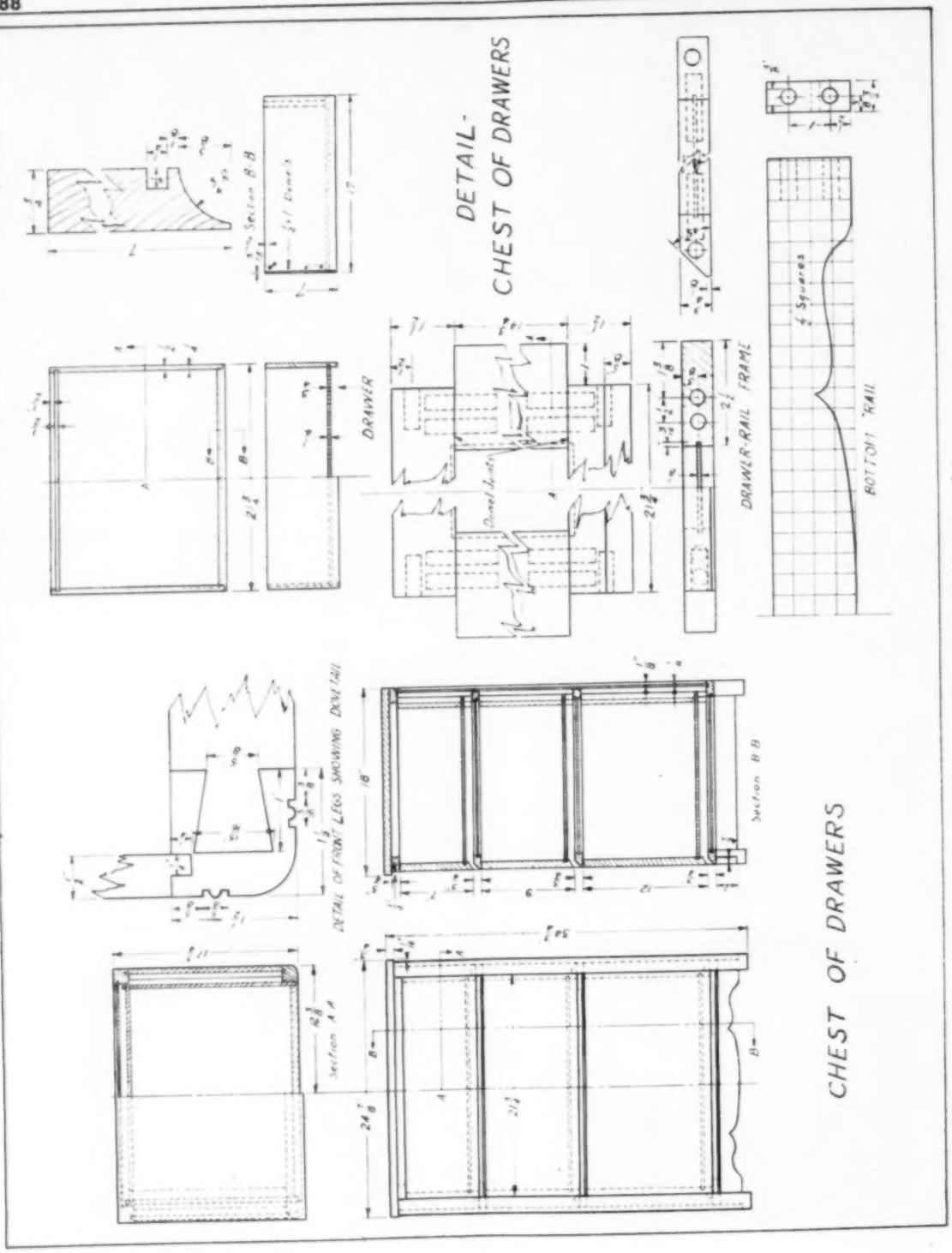
SKETCH 1 VANITY DRESSER

SKETCH 2. UNIT BOOKCASE

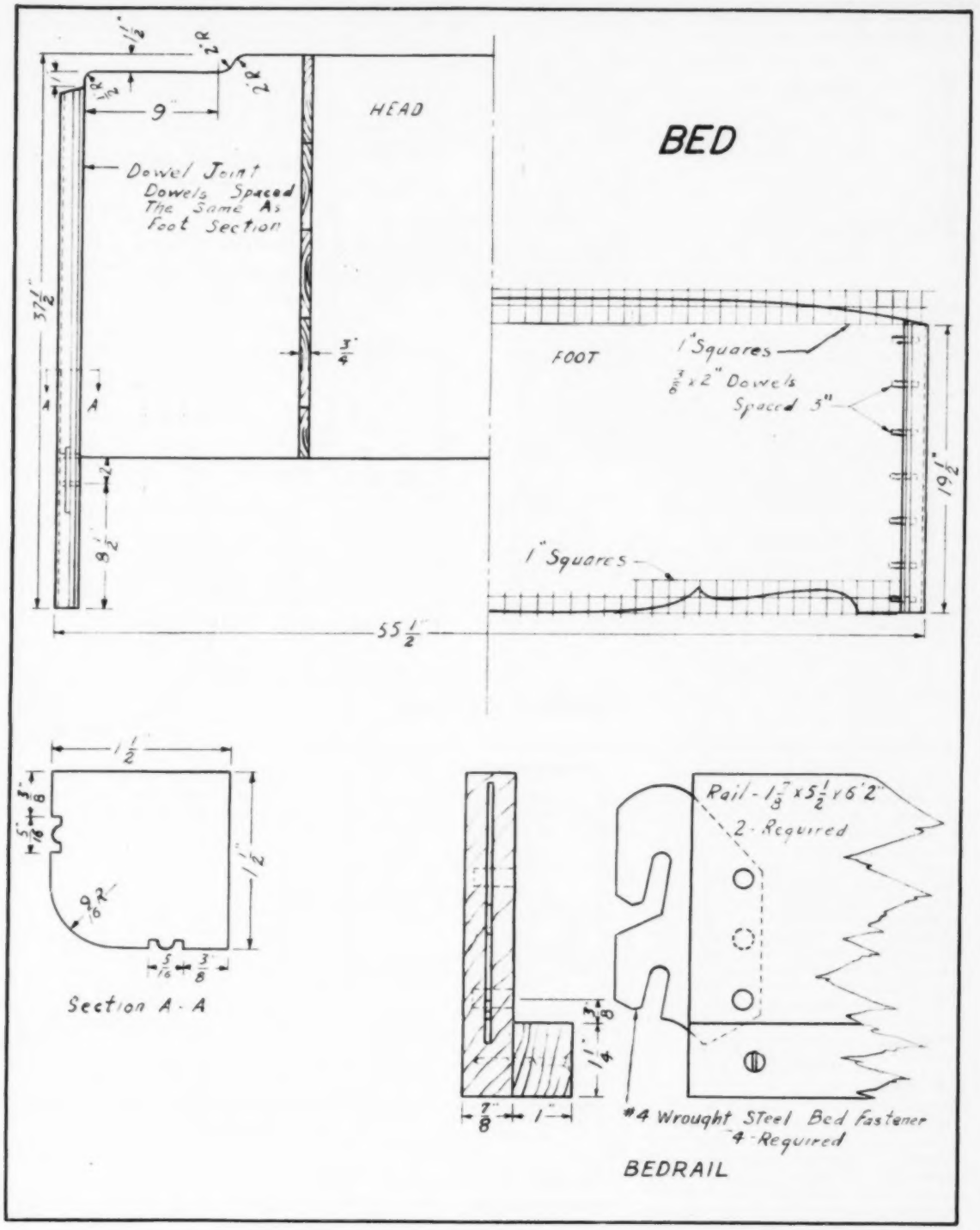
Bedroom suite



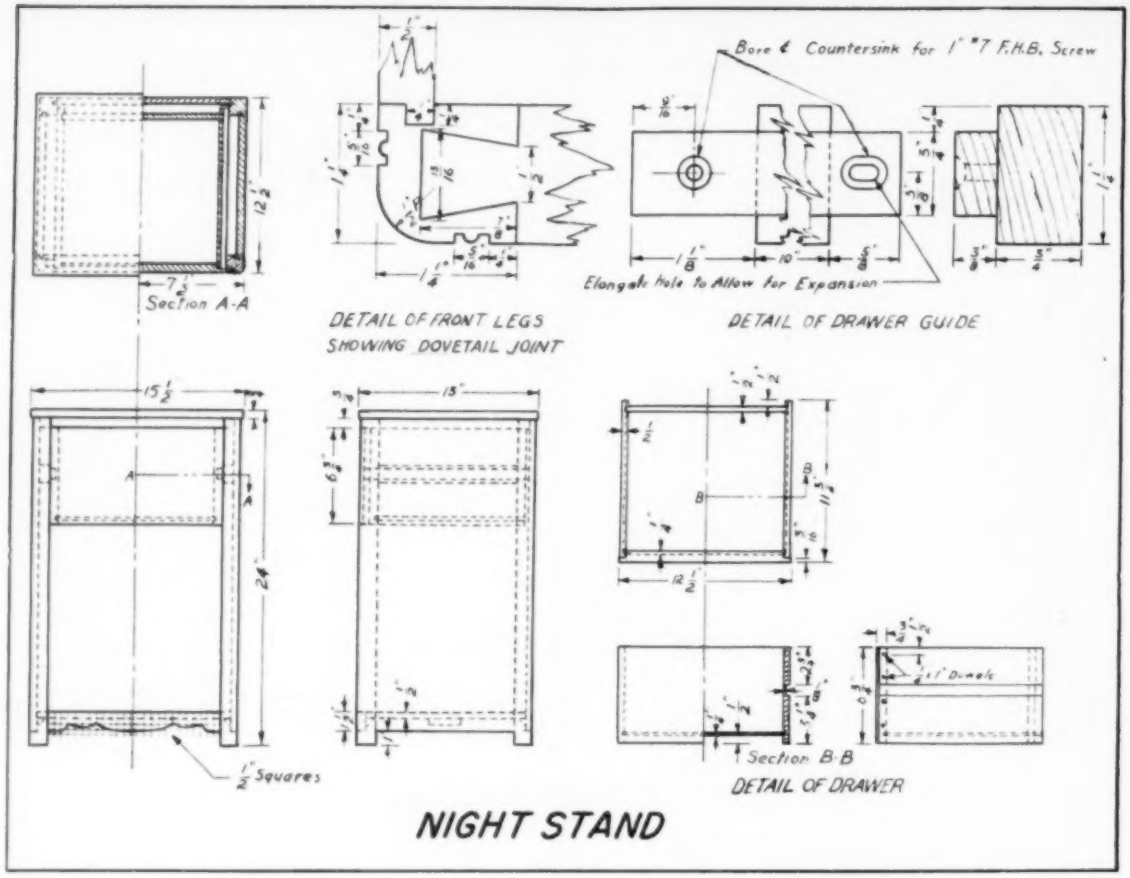
Bed, night stands, and dresser



Details of chest of drawers



Details of bed



Details of night stand

At the time these projects were made ½-in. solid walnut was used for the sides of the chests and sides and backs of the stands because walnut plywood was not available. However, students may wish to use ¼- or ⅜-in. plywood instead of the ½-in. solid material. In any case provision should be made for expansion. Dowels were used in the construction of the drawers. Dovetail construction may be preferred in some cases.

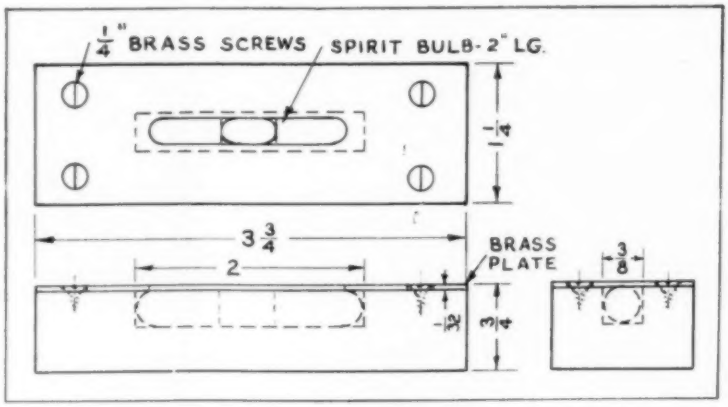
Any type of durable finish should be used. Some students may wish to add glass protective tops on the chests and night stands.

HANDY MINIATURE SPIRIT LEVEL

I. M. FENN
Chicago, Ill.

The small level described here, requires little material and is simple to construct.

Obtain a piece of close grained wood, according to the dimensions shown in the illustration. The brass plate, spirit bulb, and screws can be purchased in almost any hardware store. Square up the wood, using a try square to test the sides. Then bore holes for the bulb. Use a chisel to clean out the slot. Make certain that the bottom of the slot is parallel to the base. Use glue or airplane cement for gluing the spirit bulb in the slot. Both ends of the bulb must rest evenly on the bottom of



Handy miniature spirit level

the slot. Place the brass plate on the wood, and screw securely to the base. A finish may be applied to the wood for purposes of protection.

The miniature level is very handy and useful for checking surfaces, hanging pictures, shelves, and posters and displays.

THE MODERN IN SOLDERING

A. F. BICK
Milwaukee, Wis.

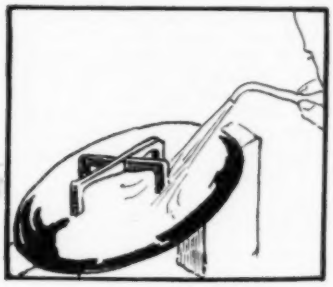
Industrial education teachers should keep their methods up to date lest time point its finger at them. They should study industry, and when industry introduces new methods, shop teachers should not be slow to follow.

Soldering procedures, for example, can now be much simplified.

A new industrial method saves time and energy, simplifies procedures, gives fine results, and lessens the number of failures.

Method of Procedure

Aluminum soldering: (*a*) emery contacts; (*b*) apply alloy paste (A 500);* (*c*) heat to 550 deg. F. (any heat source). Cool slowly.

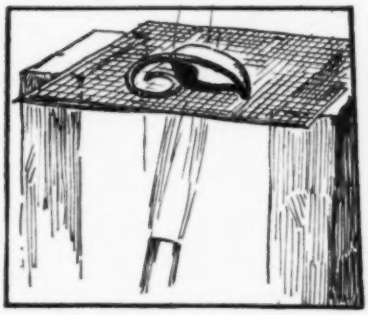


After seeing what this method accomplishes, you will no longer say aluminum cannot be soldered. Our students are actually doing it.

Polished brass soldered to polished brass: (*a*) file contact on underside of piece to be affixed: (*b*) butter that side with alloy paste (G 301);* (*c*) set on the piece to which it is to be soldered, and heat to 320 deg. F.

Observe: There is no surface oxidation, and there is no fuss nor bother.

Soldering silver: With this new method there need be no more meticulous cleaning and boiling in acid, no borax grinding, no snipping of silver alloy, no careful wiring, no fluxing



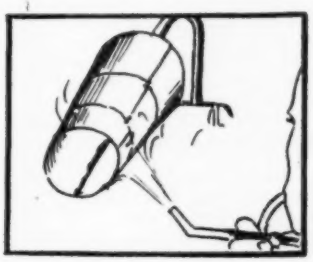
and preheating, no careful transfer and placement of snippets from slate to joint, and no tricks in heating.

Instead, the directions are merely: (*a*) emery contacts; (*b*) apply alloy paste (S4 1050, or 1100);* (*c*) heat.

Result: A clean, neat job each time.

An experimental piece, heavily oxidized and not precleaned in any way, was successfully soldered with excellent flow and bond.

Experiments show that iron can be soldered to iron, copper to zinc, copper to silver, brass to brass, tin to tin, by this process with good results.



An excellent experiment is to braze a bronze faucet handle. (*a*) File contacts and cut a V groove along the joint; (*b*) apply paste (S3 1250);* (*c*) heat.

See how easily the alloy runs through the joint. The same alloy also may be used to braze the seam on the copper body of a vase.

Some may suspect that there is some trick to this new method, but there is not. The students in our junior high school classes, grades 7 and 8, have used this method and the foregoing is simply a report of what they have accomplished.

*Fusion Engineering, 4504 Superior Ave., Cleveland 13, Ohio.

EQUIPMENT MADE FROM SALVAGED RADIO PARTS

WILLIAM R. STOCKING, JR.
Detroit, Mich.

Power Supplies From Salvaged Parts

Much equipment useful in teaching radio can be constructed from parts salvaged from obsolete radio receivers. Where this is done the money available is *stretched* considerably and more can be spent for books, meters, tubes, transformers, and other things which cannot be constructed in the school shop. The construction of equipment for use in the radio courses has much educational value. Students also feel that they are participating in *building up* the radio course and therefore share the credit for its success. Since the equipment must be designed to use the parts available, the students and instructor should design the equipment together. This co-operative planning helps to develop resourcefulness and enables students to see how tubes and parts can be used to accomplish specific results. Power supplies, demonstration devices, small public-address type of audio-frequency amplifiers, short wave receivers, code practice oscillators, and short wave transmitters can be constructed all or in part from salvaged parts.

Power Supplies

A radio shop or laboratory needs several power supplies to use in experiments and to operate receivers and other electronic devices constructed in the shop. These should be constructed as soon as possible. Some old receivers have separate power-supply units, or power packs, as they are called. Where these are in good condition, all that must be done is to detach the power supply from the receiver and label its a.c. and d.c. voltages. In some cases, binding posts or Fahnestock clips for making connections must be added. If the power pack has no *bleeder* or voltage divider connected across its d.c. output, a *bleeder* resistor should be connected between the *B*+ and the *B*—. This should be a 15- to 20-watt resistor of from 40,000 to 100,000 ohms. The bleeder resistor puts a small drain on the power supply at all times and thus prevents the filter condensers from retaining a charge after the power pack is turned off. Power supply parts can be dismounted from receivers with *built-in* power supplies and reassembled into separate units. Much time will be saved by care in dismantling the old receivers. Power transformer windings should be marked as they are disconnected. The five volt rectifier filament winding can be identified as the two wires connected to the filament prongs of the rectifier tube socket. The ends of the high voltage auxiliary winding are the wires connected to the plate prongs of the rectifier tube socket. The center tap of the high voltage winding is connected to the most negative part of the receiver. In most receivers this will be the *B*— which is *grounded* to the chassis. In receivers where the filter choke is in the negative lead, the center tap of the high voltage winding will be connected to one end of the filter choke. Sometimes the

center tap is connected to one end of a resistor which is used to supply grid biases. A diagram of the receiver being dismantled will be very helpful. The voltage of the transformer's filament or heater windings can be determined by observing to what kind of tube it was connected and looking up the filament or heater voltage of the tube on a chart.

If the receiver power pack section being dismantled uses electrolytic filter condensers, these should usually be replaced with new ones. If space is not at a premium, it would be well to use paper filter condensers. Paper condensers give better filtering action per microfarad and last longer than do filter condensers of the electrolytic type.

Some old receivers used type '10 or '50 tubes in their audiofrequency power output stage. Their power supplies will deliver from 500 to 600 volts d.c. This will require 1000 volt paper filter condensers. Such power supplies are dangerous and should be used only with transmitter units under careful supervision. Students should be warned of the dangers and discomforts of high voltage direct current from any power supply.

Many receivers use the field coil of their dynamic speaker as the filter choke. In these cases, the loud-speaker and power supply can be mounted in a box together with binding posts added for making connections to the loud-speaker or to its *matching transformer*. This combination of power supply and loud-speaker is very useful. If a compact power supply only is wanted, a regular filter choke should be used.

Many modern radio tubes are constructed with 6.3 volt heaters. Many old receivers used tubes with 1.5 volt, 2.5 volt and 5 volt filaments or heaters. Tubes with 6.3 volt heaters will operate very well on 5 volts, although it will take them a bit longer to *warm up*. Transformers often have two 2.5 volt windings which can be connected in *series adding* to operate 6.3 volt tubes. Power supplies vary in the number of milliamperes of pure direct current they are capable of delivering. This can be determined by adding together the plate and screen grid currents of all the tubes used in the receiver from which the power supply was salvaged.

The following diagrams are typical of power supplies salvaged from old receivers. They are power packs of the full wave type:

Care should be taken to make sure *that polarity is observed* whenever electrolytic condensers are wired in. For operating small one tube receivers, small half wave *a.c.–d.c.* power supplies can be constructed. Any .3 ampere heater tube can be used as a rectifier by connecting all the grids to the plate. A 30 or 40 watt lamp can be used for the heater voltage dropping resistor. The circuit is as follows:

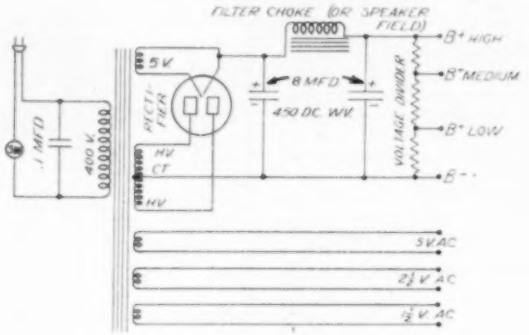


Diagram No. 2

Students should learn the following information about power supplies:

Radio tubes must have two kinds of electricity for their operation: (1) low voltage a.c. or d.c. electricity to light their filaments or heaters, and (2) high voltage *pure direct current* for the tubes' plate circuits. In battery receivers, the low voltage electricity for the filaments was supplied by the *A* battery and the plate voltage was supplied by the *B* battery. Plate or power supply voltages are commonly spoken of as the *B+* and *B—* voltages.

Power supplies change the commercial 117 volt alternating current into high voltage pure direct current for the tubes' plate circuits, and furnish low voltage a.c. for the filaments or heaters. Receivers usually have *built-in* power supplies. Transmitters usually have separate power packs.

The most simple power supply used in small receivers is the transformerless or *a.c.–d.c.* power supply. The tubes in a receiver with this kind of power supply have their heaters connected in series with each other and in series with a resistor of the right size to drop the 117 volt a.c. electricity down to the sum of the heater voltages of the tubes in series. This voltage dropping resistor is often built into the line cord and causes the line cord to get warm when the receiver is in operation. In such a series arrangement, the number of *amperes* of current used by the *heaters* of *each tube must be the same*, although the voltages may be much different (.3 ampere heater tubes are used in some receivers; other receivers use .15 ampere heater tubes). Where the sum of the heater voltages is 117 volts or more, a voltage dropping resistor is not needed. (For example a 35Z5, 50L6, 12SA7, 12SK7, 12SQ7 series of tubes needs no voltage dropping resistor because the tube voltages add up to 121 volts.) The heaters require .15 amperes.

The a.c.–d.c. power pack designed for use in the shop and laboratory, whose circuit appears in diagram No. 3, uses .3 ampere tubes with a 30 or 40 watt bulb as the voltage dropping resistor.

In an a.c.–d.c. power supply, a half wave rectifier changes the 117 volt a.c. into pulsating d.c. To smooth out this d.c. a filter consisting of a filter choke and two filter condensers is used. The field coil of the receiver's dynamic speaker is commonly used as the filter choke. The filter choke prevents sudden current changes. The filter condensers store up electrons to prevent sudden voltage changes. Thus the pulsating d.c. electricity is changed into pure direct current. A receiver

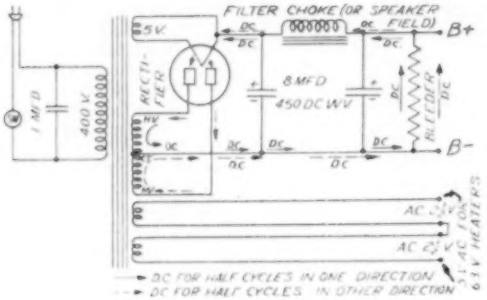


Diagram No. 1

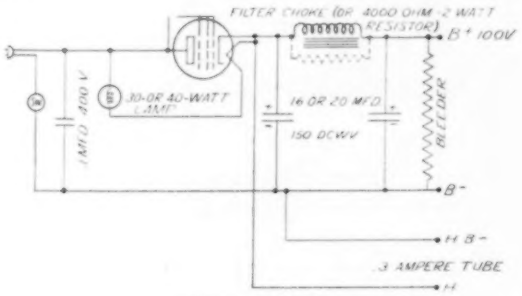


Diagram No. 3

that develops a bad hum usually needs new filter condensers. The old ones have dried out, lost their capacity, and can no longer store up enough electrons to prevent sudden voltage changes. A typical a.c.–d.c. power supply circuit is shown in Diagram No. 4.

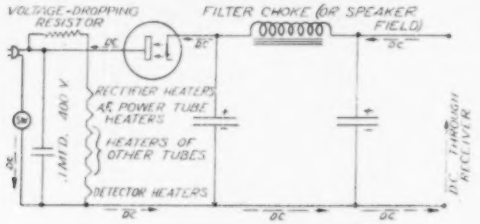


Diagram No. 4

The *order* in which the heaters are connected should be observed. The detector tube is the most sensitive and its heaters are connected to the B— end of the series because it will be least likely to ***pick up a hum*** there. The rectifier heaters are placed at the voltage dropping resistor end of the series. In general, the heaters of the more sensitive tubes are placed nearer the B— end of the series.

The path of the d.c. plate current through the power supply should be noted. Students should learn that the a.c. is changed into d.c. because electrons can pass through the rectifier tube only from the hot cathode which *boils them off* to the cold plate (or anode) which *picks them up*. The .1 mfd. 400 volt condenser across the a.c. line is to reduce *hum*. An *a.c.–d.c.* power supply is so called because it will operate on a 110–117 volt d.c. line when it is plugged in so that rectifier plate side of the line is connected to the plus side of the outlet.

Full wave power supplies are used for large receivers, public-address amplifiers, and transmitters, because larger amounts of d.c. power are needed than could be supplied by means of transformerless power supplies. The power transformer has a primary and several secondary windings. There is a 5 volt winding that supplies current for the filament of the rectifier tube. Another low voltage secondary supplies current for the heaters of the tubes. When full wave power supplies are used, the tube heaters are wired in parallel and the heater voltage requirements of all the tubes used must be the same. A center tapped high voltage secondary furnishes the electricity which is rectified and filtered to furnish the pure direct current for the tubes' plate circuits. The center tap of the high voltage winding becomes the B— of the power supply. The ends of the high voltage secondary are connected to the plates of the full wave rectifier tube. The filament of the rectifier is so connected to its secondary and a wire from it goes to + ***input*** end of the filter. The filter is similar to that of the *a.c.–d.c.* power pack except that higher voltage filter condensers are used and the filter choke or speaker field is larger. In operation, one plate of the rectifier tube rectifies the current from one half of the high voltage secondary, when the a.c. is in one direction. When the a.c. is in the other direction, current from the other half of the high voltage secondary is rectified through the other plate of the rectifier tube. Thus the rectifier tube is delivering current to the filter and receiver every half cycle of the alternating current. Since there are twice as many pulses of d.c. from the rectifier, the output of a full wave rectifier is twice as easy to filter as the output of a half wave rectifier where there are half cycle intervals between pulses. Because of voltage drops caused by the current passing through the resistances of the rectifier tube and filter choke, each half of the high voltage secondary must deliver more than the desired d.c. output voltage. Transformers designed for power supplies delivering 250 volts pure direct current have secondary windings delivering 300 to 340 volts either side of the center tap.

Students should be encouraged to examine circuits of several different receivers and observe their power supplies. A series of questions comparing various types of rectifier tubes and power supplies could be given to students constructing these units.

The power supplies constructed from salvaged parts can be used to run demonstration devices, experiments, amplifiers, receivers, code practice oscillators, and small transmitters.

DIFFERENTIATING BETWEEN MAGNESIUM AND ALUMINUM

LOUIE S. TAYLOR
Assistant Professor, Industrial Arts
University of California, Santa Barbara College
Santa Barbara, Calif.

Magnesium was first produced in France a little more than a hundred years ago and remained a laboratory curiosity until the beginning of the twentieth century when commercial exploitation began in Germany.

In the United States magnesium first received attention at about the time of the civil war, but by 1915 metallurgists in this country had begun with concerted efforts to explore the possibilities of this lightest of all structural metals. From that day on, however, the production of magnesium grew by rapid strides and the price dropped proportionately. The recent war was responsible for the renewal of enthusiasm for this metal, and many new uses were found for magnesium and magnesium alloys. As the needs and demands for the metal expanded it became evident that new sources of supply would have to be found. Extraction from brine wells and from sea water by the electrolytic process became the most economical means of obtaining it, and at present, by far the largest percentage is produced by this method.

The extensive use of magnesium and its alloys during the war period created large stocks of scrap and surplus metal that have now filtered into the scrap metal market. Quite often they have been mistaken for aluminum and may have been sold as such, or they have, perhaps, been mixed with aluminum in the foundry or shop. This faulty identification has resulted in some very serious consequences that should be brought to the attention of the shop teacher. Herein lie the hazards in connection with the use of magnesium and the alloys of magnesium as a source of inexpensive supply of casting metal.

Magnesium has the peculiar property, under certain conditions, of taking fire and burning with an intense heat. The more oxygen there is present the more brilliantly it will burn and consequently the more dangerous it becomes. Once a fire from magnesium has started extinguishing it becomes a grave problem. Industry employs special powders manufactured for the purpose. Water; carbon dioxide gas; dry chemical; foam-type, and vaporizing liquid type extinguishers will tend to accelerate the burning and perhaps cause spattering as well.

In the large foundries where the casting of magnesium is an everyday occurrence, every precaution is taken to prevent the possibilities of fire. The molten metal is covered with sulphur or smothered with sulphur dioxide gas to absorb the oxygen that might otherwise come in contact with the melt. Magnesium, like lead, reacts violently with any kind of moisture. A wet tool accidentally or purposely put into molten magnesium is inviting disaster.

Unless your school shop is equipped with precautionary measures it is unwise and extremely unsafe to attempt the casting of magnesium. Even with such equipment available the sulphur fumes would be objectionable and would be reason enough to discourage any such activity.

It therefore behooves every metal shop teacher to make an effort to learn to distinguish between magnesium and aluminum and avoid possible danger to himself and his students.

The following are a few simple tests that may assist in determining which of the metals is aluminum and which is magnesium.

1. The specific gravity of aluminum is 2.70 and that of magnesium is 1.74, which means that magnesium is about a third lighter than aluminum. This factor alone is often sufficient to dispel any suspicion. The identification is made by simply hefting the piece suspected of being magnesium and comparing it with another piece that is known to be aluminum. The lighter piece will be magnesium, assuming

of course that the two pieces have equal volume.

2. Cast magnesium is, for the most part, more brittle than cast aluminum and can often be contrasted with aluminum by this test. This can easily be accomplished by striking the sample with a hammer. Magnesium will break and aluminum will most often bend or deform before breaking.

3. Cast magnesium when fractured shows a lead gray color with fine granular structure while aluminum is more dense and white in color. Frequently this simple test alone is sufficient.

4. When all other tests have failed and there is still doubt as to which is magnesium, a small amount of filings or particles of the metal may be placed on a firebrick or on an asbestos pad and heated with a welding torch. Magnesium will ignite and burn while aluminum will tend to flow together without burning. More oxygen supplied from the breath or from the torch will cause the magnesium to burn more rapidly and more brilliantly, leaving a small amount of white powder and little doubt as to which of your scrap metal is magnesium.

INDIAN SILVERSMITHING

BEN HUNT
Hales Corners, Wis.

(Continued from page 250 of the June, 1949, issue)

Concha Belts

Silver concha belts are probably the most expensive pieces of jewelry that are made and worn by the Navaho Indians. They are worn only by those who can afford to buy or make them. Before Indians learned to do silver soldering, and set turquoise, conchas were made similar to the ones shown in Figures 1 and 5, Plate 38, rather plain and of heavy silver. They are simple in form, and easily made. In this type of concha belts the strap was drawn through the opening and sometimes laced to a wider and heavier strap, as shown in Figure 6. A glance at Figures 8 and 9 shows that some of the belts have wide straps and some have a single narrow strap. Butterflies, such as shown in Figure 4, are often placed between the conchas.

After the Indians learned how to solder, the appearance of the conchas changed, as may be seen in Figures 8 and 9. The great majority of conchas, as shown, have a sort of fluted sunburst in the central raised part, some of which are set with turquoise. These conchas are as a rule made with a punch and die. The punch is filed to shape first, and hardened. Then another piece of iron is heated to a white heat and the punch is hammered into it. This, of course, is not done in one operation, but requires many repeated heatings and stampings until the entire face of the punch has been sunk into the die. The Indian, however, does not take into consideration the amount of clearance to allow for the metal being stamped and consequently, every now and then, one finds conchas with holes torn into the flutings, which was caused by the lack of clearance.

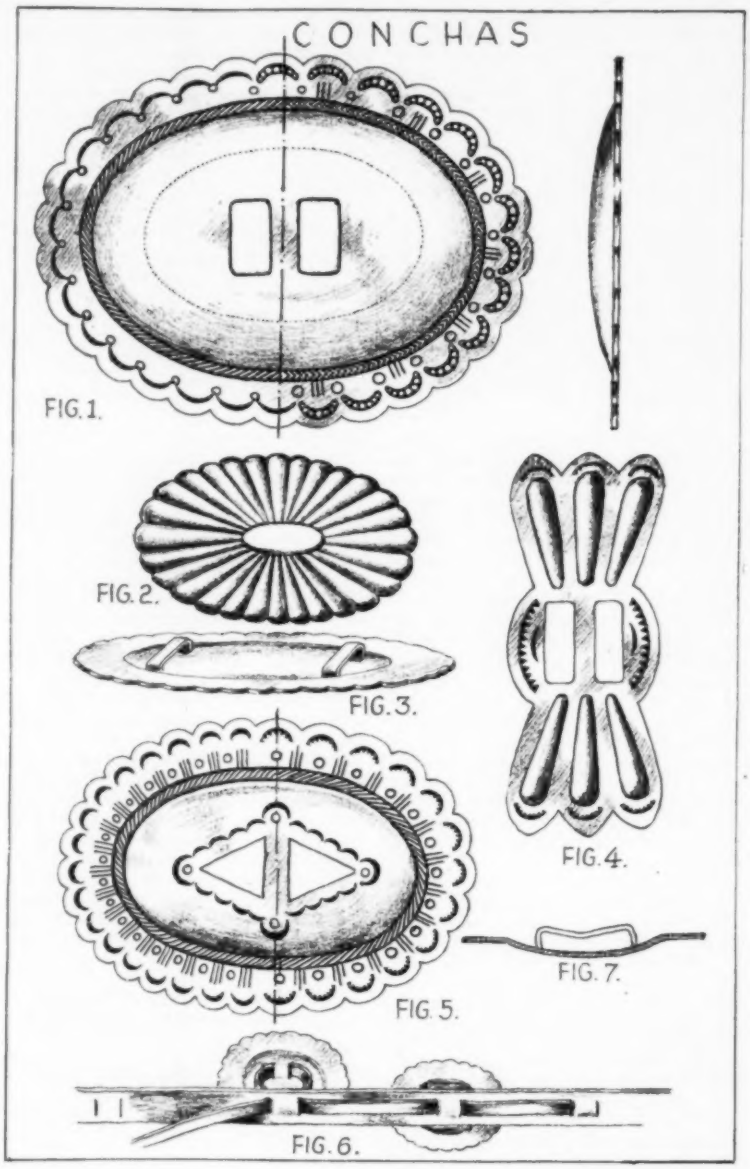


Plate 38

When no complete dies are available, the fluting is done by hammering up each section of the sunburst separately, and such conchas are readily noticed by the smaller or greater number of irregularities. In some belts one finds these sunbursts with from 24 to 27 separate flutes. The large concha belt in Figure 8 was originally made of old type conchas, the sunburst having been added later. This, by the way, is one of the most beautiful belts the author has ever seen and it appeared to him that the method of applying or adding the fluted sunburst is worth describing here, since it is not a bumped up sunburst, but one that is comparatively easy to make. In previous chapters the method of how to bump up flutings has been shown and explained; also how they can be bumped up and soldered on

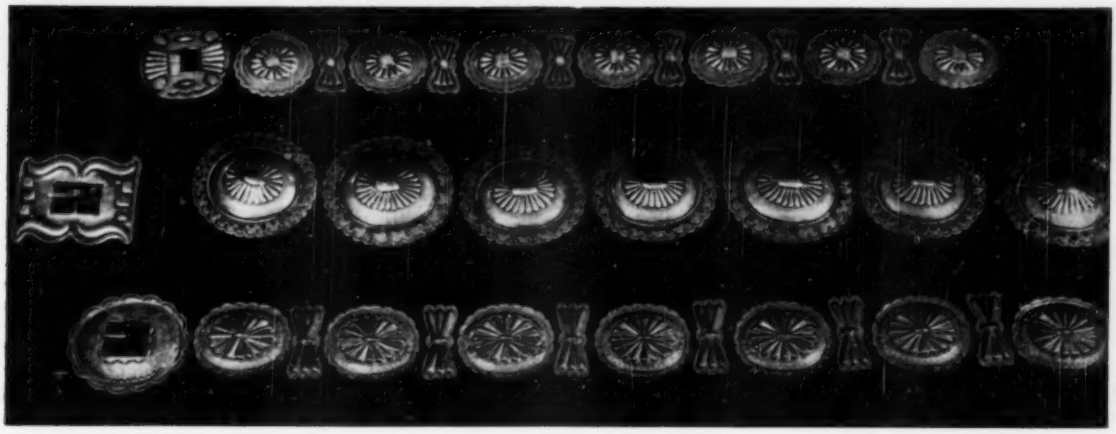


Fig. 8. Examples of concha belts

separately. Sunbursts with wide fluting can be bumped out on the concha if one wishes, but those shown on the center belt in Figure 8 were made similar to the one illustrated in Figure 1, Plate 38. Then the sunbursts were made by hammering down the radial lines in rather heavy silver and filing the flutings. The ends are then rounded and scalloped with a file and the bottom filed smooth. Figure 2, Plate 38, shows a top view of such a sunburst. It is hammered or bumped up in the same wooden form used to bump up the concha and then soldered in place.

Most of the concha belts are made along similar lines. The buckles are of all styles and shapes, and in no case do they even remotely match the conchas used on the belt. Probably the Indians feel that after making from six to nine identical conchas, it is a pleasant diversion to make an entirely different buckle. Occasionally one finds square conchas used on belts. These were most likely made for women although the large square conchas in the belt in Figure 9 are on a man's belt.

Outside of the bumped up sunburst, making a concha is comparatively simple. The oval is cut out and the edges filed. That is, it is filed to the oval shape, without the scallops. Next, with a dividers or by means of finger gauging, lay out the line to mark the edge of the bumped up section and a second line outside of it to mark the width of the rope design. Stamp the rope design. Decide on the design for the border and stamp that onto the blank. It will be necessary to do a little figuring and measuring in order that the design will come out even. Laying out the oval in quarters with a pencil will help a lot in the spacing of the border stamping. Next file the scallops to conform with the half moon stampings.

If the concha to be made is of the old style, shown in Figures 1 and 5 on Plate 38, two openings must be cut for the belt, as shown. These can be cut out with a small sharp chisel or with a jeweler's saw, and finished with a file. The bumping up of the center is done on a block of wood hollowed out to the desired depth. Usually the center is raised about ¼ in. After bumping up, turn the concha face up and tap down the rim with a piece of wood and a hammer, or by going around the inner line of the rope design with a lining tool. Any irregularities in the domed part may be filed even.

If the sunburst design is to be used, the openings for the strap need not be cut, but the sunburst must be shaped, stamped, filed, and bumped up as previously described, after which it is soldered in place.

The butterflies, shown in Figure 4, Plate 38, are made by bumping up the flutes, after which they are outlined with a lining tool. Bump them up from the bottom, turn them face up and tap along the outlines again to flatten the rim. Repeat until you have the fluted parts high enough.

The old style conchas do not require loops for the belt strap, but the new style do. The

Fig. 9. Examples of buckles used on concha belts

loops are made of copper about ⅛ in wide. Two loops are required for the concha, shown in Figure 3, Plate 38, and one for the butterfly. These loops should be a little narrower than the belt strap so they will not slip. Solder them in place, and if they show a tendency to slip on the belt strap, press the center down as shown in Figure 7, Plate 38.

The conchas are either strung on a narrow strap or as shown in Figure 6, Plate 38. The wide belt is often as wide as the conchas, as may be seen in some of the belts shown in Figure 9.

As to buckles, the making of them was described on pages 131–133 in the March, 1948, issue of this magazine. A number of ideas for buckles also may be obtained by studying Figures 8 and 9 in this issue.

The writer has fine concha belts set with turquoise, but his greatest love is still for the old style conchas. The museum pieces on display in the southwest museums and collections are every bit as fine as the modern belts, especially if the domed centers are filed and polished evenly. There is something about the simplicity of these older pieces that catches the eye.

MOLYBDENUM

Molybdenum — *Moly* among friends for easier pronunciation — is one of the metals on which we are a *have* nation. At last reports approximately 90 per cent of the world's production was produced in the United States. In the pure state molybdenum is a heavy metal, specific gravity 10.2, with a very high melting point — 4748 deg. F. In the pure state it is primarily used for electrical purposes, its ductility making it ideal for fabrication into wires and sheet. About 95 per cent molybdenum, however, is employed in alloy steels and is usually introduced in the form of ferro molybdenum. In alloy irons and steels Moly goes directly into solid solution and refines the matrix, increasing the strength, toughness, and wear resistance. — *Belmont Metal of the Month, Brooklyn, N. Y.*

Veterans Administration approved 1,531-402 G.I. loans from the beginning of the program in June, 1944, through 1948. Of the total, 1,380,285 were for homes; 48,911 for farms; and 102,206 for businesses.

Of the 2,263,654 veterans on Veterans Administration disability compensation and pension rolls on December 31, 1948, a total of 1,656,838 served in World War II; 457,206, World War I; 45,440, the Regular Establishment; 103,465, the Spanish-American War; 667, the Indian Wars; and 38, the Civil War.

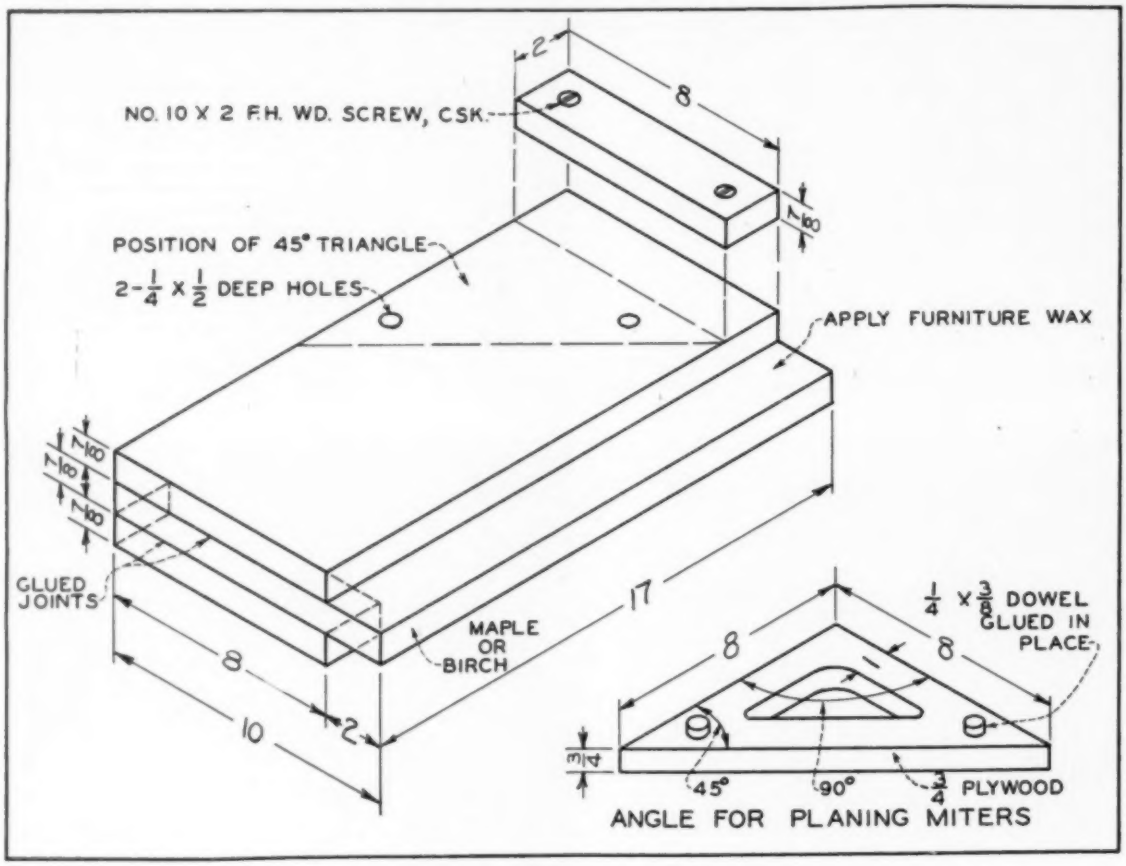
By the end of 1948, a total of 53,893 World War II veterans had exhausted their entitlement for education and training under the G.I. Bill. At the same time, 75,-669 disabled veterans who formerly were training under Public Law 16 were declared rehabilitated.

COMBINATION BENCH HOOK AND SHOOT BOARD

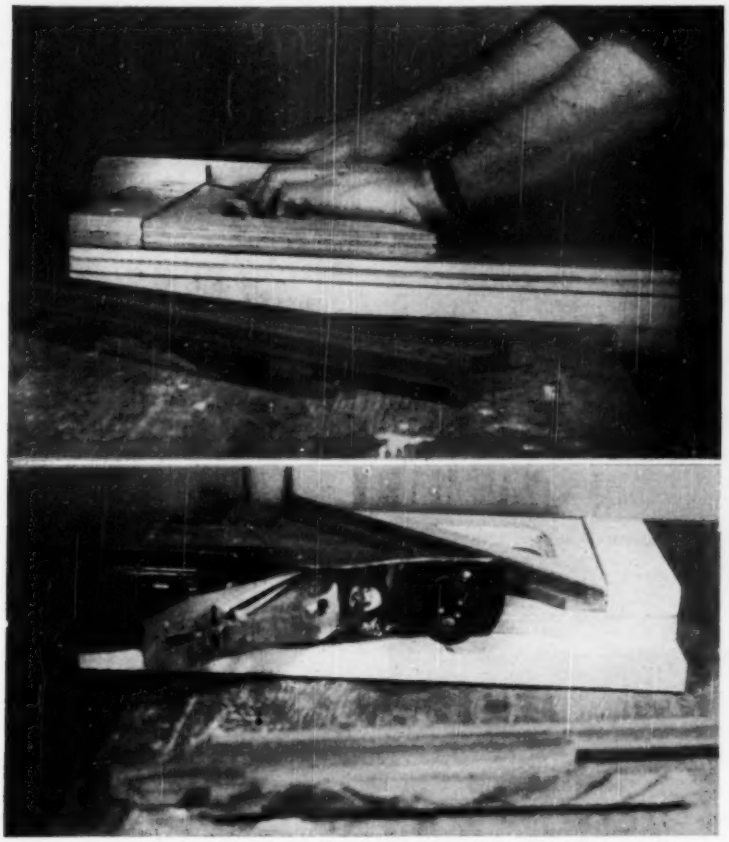
HARRISON NEUSTADT
New York City

Had nature endowed you with three hands it is doubtful that the third hand would prove to be more useful than this accessory for the workbench.

Some of the many uses that it can be put to



Detail of combination bench hook and shoot board



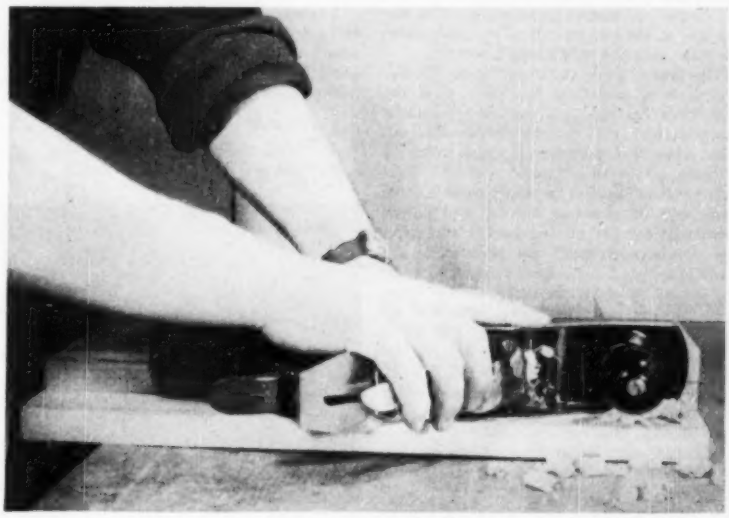
Combination used as a shoot board for trimming up miter cuts

are to cut off short pieces of wood, dowels, etc., with the backsaw; square up end grain with the plane; with the use of the 45-deg. angle and a plane true up miters on moldings, picture frames, etc.; to hold wood or metal for drilling with a hand or portable electric drill; and for chiseling cross grain. While not intended to replace the vise it can be used to good advantage where a vise is available.

It is important that planes used for cross-grain planing must be at their sharpest; otherwise, with a dull plane your efforts will be wasted.

Glue the 8 by 17-in. board to the 10 by 17-in. piece, and clamp until set. Glue and screw the 2 by 8-in. pieces in place. The one on the 8 by 17-in. piece must be absolutely at 90 deg. With the use of clipped off brads locate the dowel centers and drill holes in both the triangle and the 8 by 17-in. piece. Glue dowels into the angle and make a snug fit into the 8 by 17-in. piece.

Tip to pedestrians: Think for two — the driver and you!

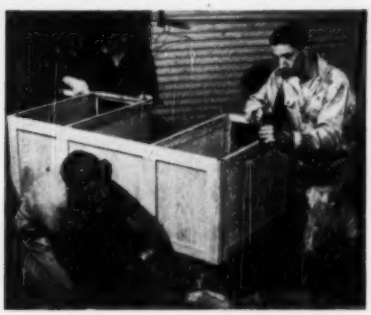


Combination used as shoot board

MODERN TEACHER'S DESK

EARL KIMBALL
Director of Industrial Education
West High School
Waterloo, Iowa

The teacher's desk shown in the accompanying illustrations was designed in response to a request for a modern teacher's desk that could be produced by vocational woodshop classes. The desk is made of oak and is finished light golden. In keeping with modern styling of office furniture the design features pedestal supports and rounded corners.

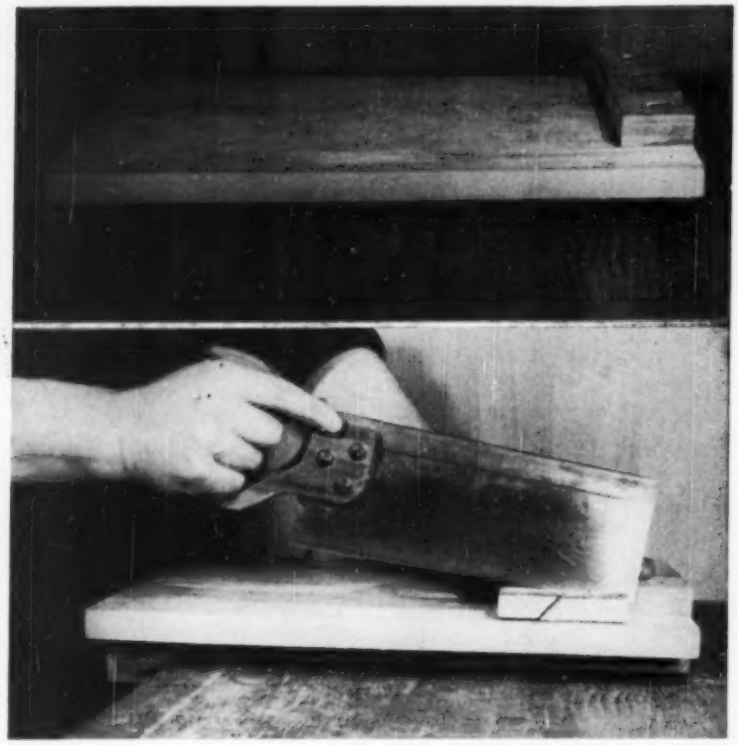


Assembling the modern teacher's desk

Figure 1 (see drawing on page 299) shows the drawer side of the desk; Figure 2, the right end; Figure 3, the back. Figures 4 and 5 show the details of construction.

Three 5½-in. drawers on the left and one on the right provide generous drawer space. The bottom drawer on the right is letter size for filing. The middle drawer is the usual shallow utility drawer with convenient divisions for pencils, pens, erasers, etc.

Figure 4 shows the method of joining the



Combination shown on page 297, used as a bench hook

cross panels to the front and back. Tongue and groove joints 3/8 in. square run full length at all corners except where the two inside cross panels are joined to the back. Here the tongue and groove joints extend from the top rail to the bottom rail of the back panel with the muntins only being grooved.

The drawer guide shown in Figure 5 is designed to be assembled into place after the desk body has been put together. A shallow tenon secures one end to the drawer rail. The other end rests on a cleat which is fastened to the back panel.

Drawer adjustment is made easy as the guide may be raised or lowered, and shifted from side to side on the back cleat. After the drawer adjustment has been made the guide is fastened to the back cleat with screws.

All stock is 3/4-in. oak except drawer sides, plywood, and top. The drawer sides are 1/2-in. oak and all plywood is 1/4 in. The top is shown 1 1/8 in. thick but may be made 3/4 in. thick with or without a 1 1/8-in. edge. Pull-out sliding leaves may also be added on either side over the drawer compartments.

Production problems are simplified by making all four cross panels alike, and four of the six drawers alike. The stiles and rails of the panel frames are standardized at 2 1/2 in. wide. The only exceptions are the vertical stiles and muntins of the back panel which are made 3 in. wide to accommodate the corner construction. Plywood panels and drawer bottoms are designed to be cut economically from stock sheets.

A sample was made up to work out the *bugs* and plan production. The job breakdown resulted in the following list of units which could be fabricated and stored in sufficient quantities to make twenty desks:

1. Pedestals
2. Drawer compartment bottoms
3. Cross panels
4. Drawer compartment fronts
5. Back panel
6. Top
7. Drawers
8. Drawer guides
9. Drawer pulls

The final finishing

BILL OF MATERIAL

Unit	*No. units required*	*Part*	*No. pieces per unit*	*Size*
Pedestal	2	End	2	3/4 x 7 7/8 x 5
		Side	2	3/4 x 7 7/8 x 22 1/2
		Bottom	1	3/4 x 4 1/2 x 22 1/2
Drawer compartment Bottom	2	Bottom	1	3/4 x 27 1/2 x 14 3/4
		Cleat	2	3/4 x 1 3/4 x 27 1/2
Cross panel	4	Stile	2	3/4 x 2 1/2 x 21
		Rail	2	3/4 x 2 1/2 x 25 1/4
		Panel	1	1/4 x 24 x 16 3/4
Drawer compartment Front R. H.	1	Stile	2	3/4 x 1 1/2 x 21
		Rail	2	3/4 x 1 1/2 x 14 3/4
		Rail	1	3/4 x 3/4 x 14 3/4
Drawer compartment Front L. H.	1	Stile	2	3/4 x 1 1/2 x 21
		Rail	2	3/4 x 1 1/2 x 14 3/4
		Rail	2	3/4 x 3/4 x 14 3/4
Back panel	1	Stile	2	3/4 x 3 x 21
		Rail	2	3/4 x 2 1/2 x 49 1/2
		Muntin	2	3/4 x 3 x 18
		Panel	1	1/4 x 19 7/8 x 16 3/4
		Panel	2	1/4 x 11 15/16 x 16 3/4
Top	1		1	1 1/8 x 30 x 54 1/2
Drawer (small)	4	Front	1	3/4 x 5 13/32 x 13 5/32
		Side	2	1/2 x 5 13/32 x 24 1/2
		Back	1	1/2 x 5 13/32 x 13 5/32
		Bottom	1	1/4 x 24 x 12 21/32
Drawer (file)	1	Front	1	3/4 x 11 21/32 x 13 5/32
		Side	2	1/2 x 11 21/32 x 24 1/2
		Back	1	1/2 x 11 21/32 x 13 5/32
		Bottom	1	1/4 x 24 x 12 21/32
Drawer (middle)	1	Front	1	3/4 x 3 1/2 x 20 7/8
		Side	2	1/2 x 3 1/2 x 24 1/2
		Back	1	1/2 x 3 1/2 x 19 7/8
		Bottom	1	1/4 x 24 x 19 3/8
		Divider	1	1/2 x 2 7/8 x 18 7/8
Drawer guides		Back support	3	3/4 x 2 x 14 1/2
		Slide	5	3/4 x 2 1/2 x 27 3/8
		Guide	5	3/8 x 3/4 x 27 1/2
		Slide	2	1/2 x 1 1/2 x 24 1/2
		Slide	2	1/2 x 1 1/2 x 27 5/8
Drawer retainer			2	3/4 x 1 1/2 x 27 1/2
Drawer pulls			6	3/4 x 1 3/8 x 4 1/2
Footrest			1	3/4 x 3 x 27

All sawing, jointing, mortising, tenoning, grooving, and sanding throughout on all units are done with power machines. Machine cut dovetail joints are used in fastening the drawer sides together. All units are made accurately to size, ready to be put together with a minimum of hand fitting.

Assembly of the desk body is begun by gluing the cross panels, the back, and the

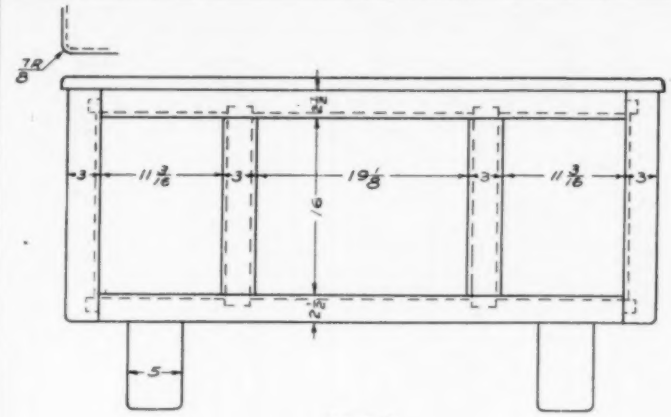
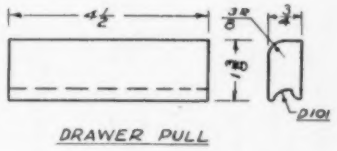


Figure 3



DRAWER PULL

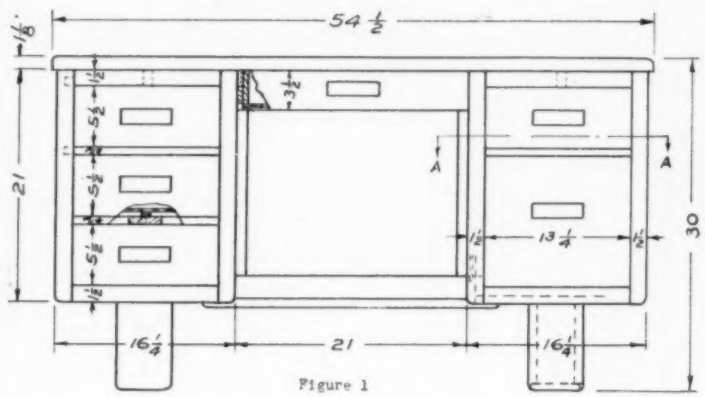


Figure 1

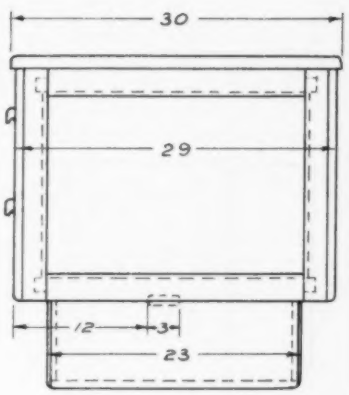


Figure 2

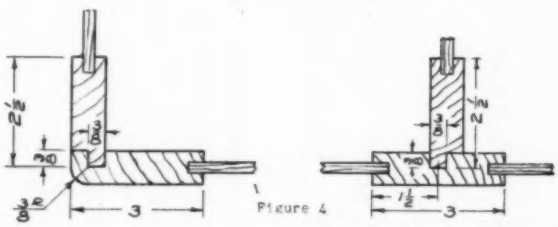
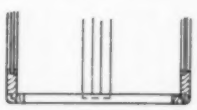


Figure 4



SECTION A–A

Figure 5

A modern design for a teacher's desk

drawer compartment fronts together. A high grade waterproof glue is used on the ⅜-in. square tongue and groove joints. The drawer compartment bottoms are fastened to the pedestals with screws before they are secured to cleats along the lower edges of the drawer compartments.

After the desk body has been assembled the corners are rounded to a ⅜-in. radius with a portable router. The footrest is fitted in place and the final scraping and sanding of the body is done.

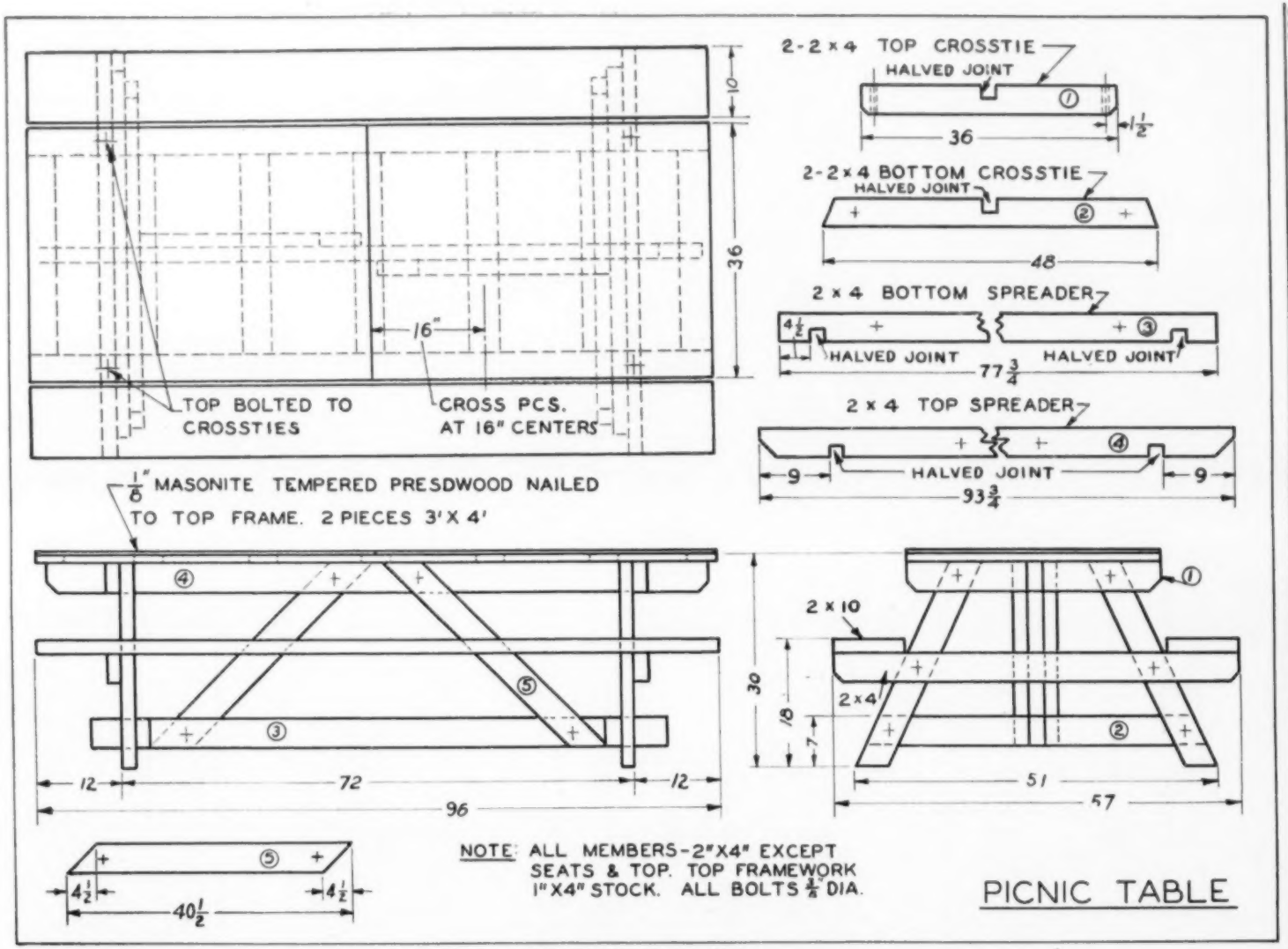
Drawer units are made so as to pass freely through the openings for them and drawer runners are adjusted to each individual drawer. The top drawer on each side is retained in place on its drawer guide by a strip placed lengthwise of the center of the drawer just under the desk top.

Drawer pulls are formed on the shaper in strips about 30 in. in length and are cut to length. Two flathead wood screws secure them in place on the drawer fronts.

The top is fastened to the body by means of metal fasteners which fit into grooves in the cross panels and allow the top to expand and contract. To maintain the spacing of the drawer compartments so that the center drawer will slide freely, two short pieces of 1 by 1 by ⅛ by 2-in. angle are fastened to the top and inside cross panels. The footrest serves as a tie at the bottom.

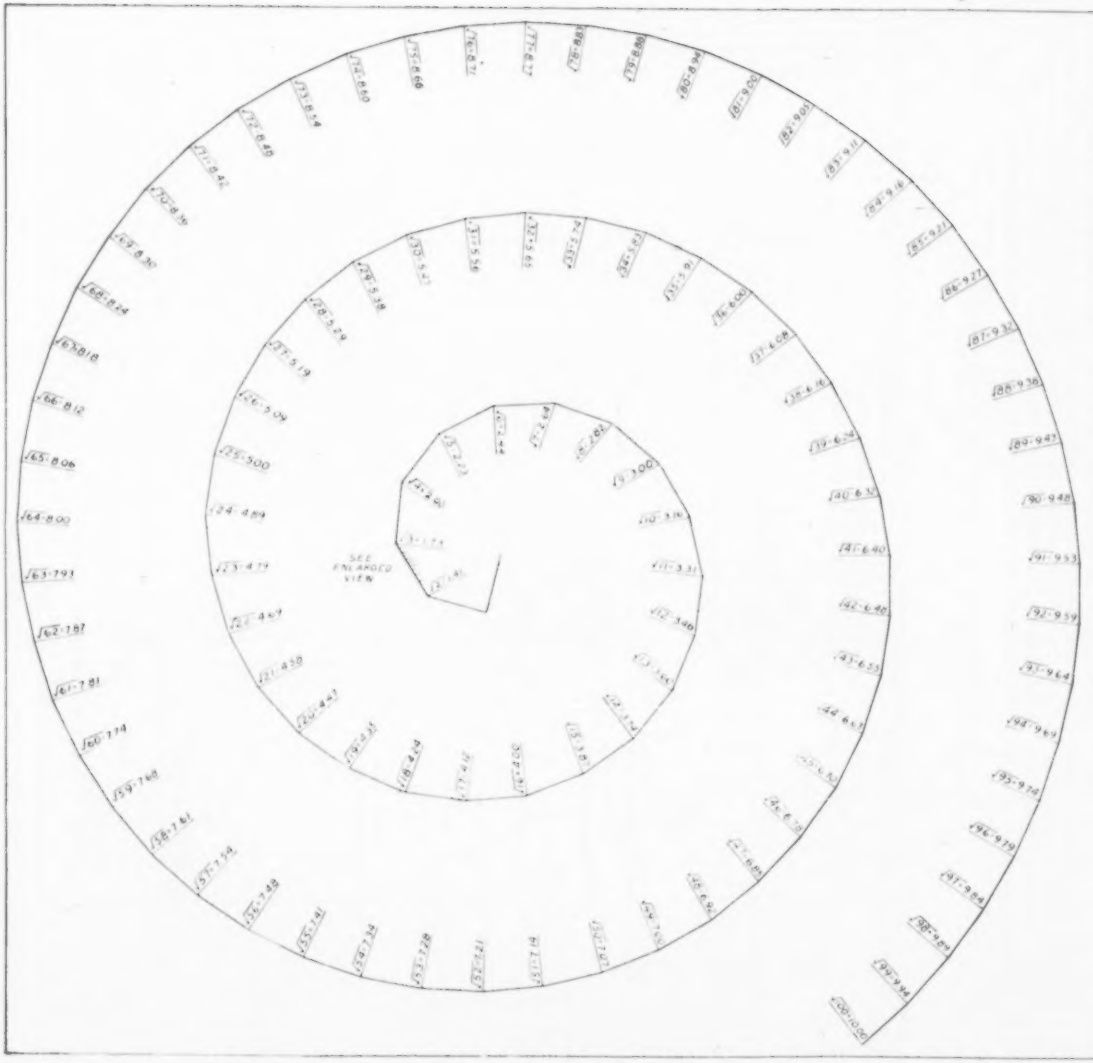
The desk is finished with a coat of natural wood filler and two coats of rubbing varnish.

Gliders are placed on the underside of the pedestals to permit easy sliding on the floor.



Picnic table with masonite top

— Courtesy of Masonite Corp., 111 W. Washington St., Chicago, Ill.



Square-Root Spiral Curve

Although the square roots of all numbers cannot be expressed arithmetically, it is possible to construct them exactly by geometric methods.

Based on the Pythagorean theorem in geometry, the process solves the problem of irrational square roots as follows:

Since the square on the hypotenuse of a right triangle is equal to the sum of the squares of the sides, assume a right triangle whose sides are unity then the hypotenuse is equal to the $\sqrt{2}$.

Although the $\sqrt{2}$ cannot be determined exactly by methods of arithmetic, it can be measured exactly by this method. If a right triangle be constructed with one side thus found equal to the $\sqrt{2}$, and the other equal to unity, the hypotenuse thus formed is equal to the square root of (3) three.

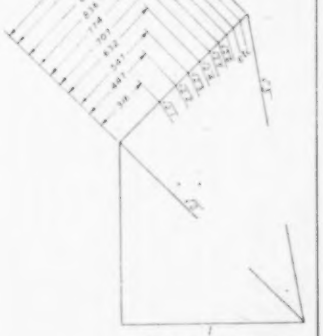
In like manner the process may be continued until we have constructed the square roots of all natural numbers between 1 and 100, shown in the main square root spiral curve.

Now, if all the sides of the triangles represented by unity be divided in proportion to the square roots of the natural numbers from 1 to 100, we have a measurable square root of all numbers from .01 to 1.00 and also from 1 to 100 to two decimal places.

Also, since the square root of any number (2, for example) is the same as the square of 100 times that number (200), we have the measurable square roots of any numbers as finely as the scale shown may be graduated.

The enlarged detail shows actual proportions of division of the unity sides of the triangle, making it possible to read square roots of decimal numbers less than or greater than unity to any extent, depending upon the size and accuracy of the curve or machine based on this principle.

This problem was suggested by Mr. John H. Clark, Jr., Principal, and developed by a senior student, Carey M. Shackelford. With Mr. Clark's co-operation and the assistance of Stephen Nemeth, another senior, the drawing was made in Murray Vocational School, Charleston, S. C.



Square-root spiral curve. Submitted by John H. Clark, Jr., Principal, Murray Vocational School, Charleston, S. C.

END TABLE

E. R. GLAZENER
Arkansas A. & M. College
Monticello, Ark.

The end table, shown in Figure 1, was designed for the advanced student in cabinetmaking. It involves considerable simple mathematics, consumer knowledge, appreciation of design and workmanship and finishing, and skills in the use of practically every machine and hand tool available in the well-equipped woodworking shop. The project develops initiative and planned co-ordinated thinking on the part of the teacher and student, and can be used as a supplementary drawing assignment.

It is suggested that two or more students work together on these tables. This will teach them to work together and to help each other in the construction. A simulated form of production can be accomplished in this manner. However, this will still require working together to produce best results. This is the procedure followed by the writer and L. S. Richardson in a co-operative venture in producing four tables. These four tables were made at a cost of between seven and ten dollars, due to the fact that approximately 90 per cent of the material was scrap strips and blocks of mahogany picked up from the shop floor. Scrap material was used, due mainly to the scarcity of fine woods, and to lower the cost. This required an added amount of planning and gluing but produced excellent results at a much reduced price.

The worker should carefully study the plans and procedure before attempting to begin the project. Figure 7 shows the stock in rough and finished sizes necessary for two tables. Some materials, supplies, etc., are left to the choice and discretion of the worker.

See Figure 7 for the parts list.

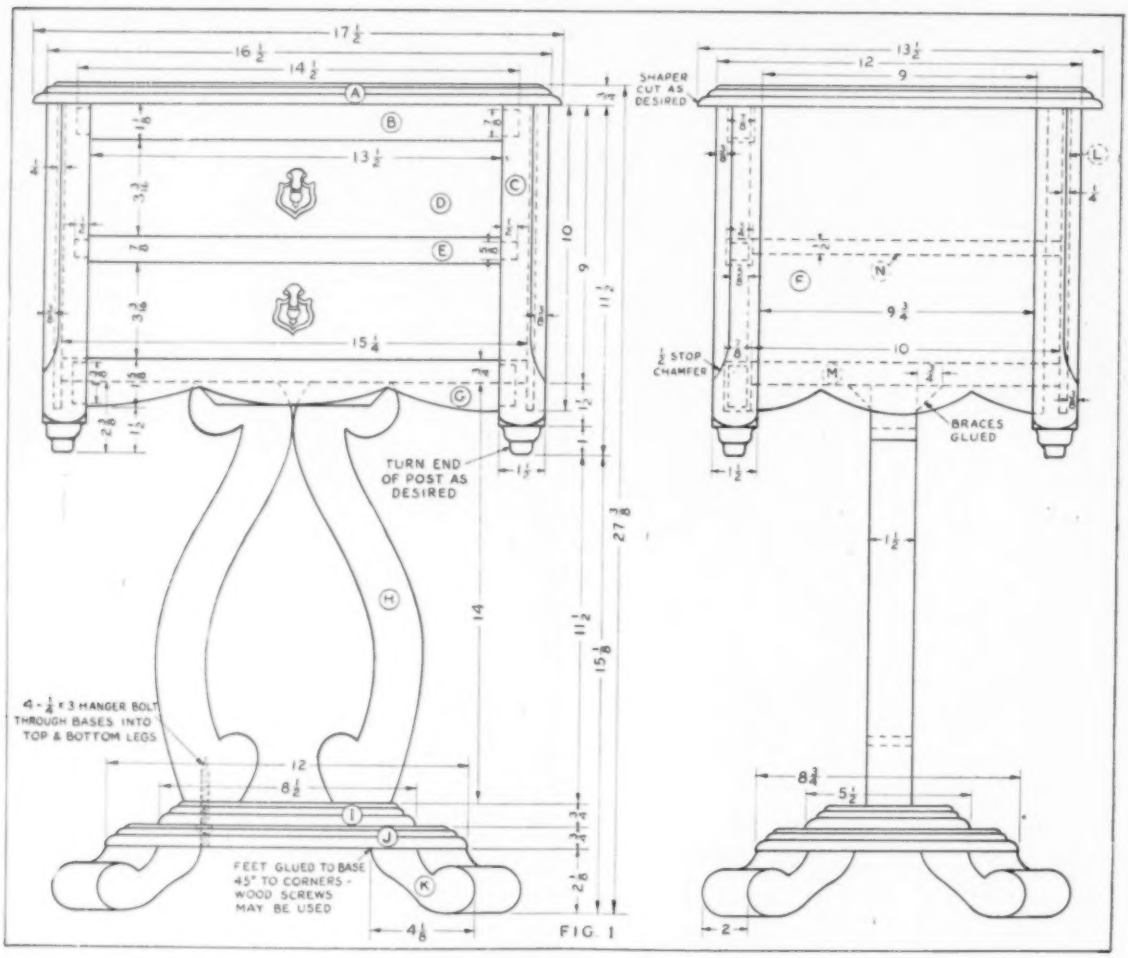
Machines

Table saw, band saw, cutoff saw, lathe, portable sander, belt sander, spindle sander, mortiser, surface planer, jointer, shaper, drill press, spray gun with equipment, veneer press.

Tools

Brace and wood auger bit, size 16; twist drills, 5/16 in., No. 25 and No. 36; wood rasp, ½ round, smooth wood files; bar and hand wood clamps; crosscut, rip-, and backsaws; jack plane, block plane; lathe tools, try or combination square; ¼- and ½-in. wood chisels; mallet; screw drivers; countersink; hand scraper; steel square; and adjustable or socket wrench.

Wood and veneer, waterproof glue, sandpaper, wet-dry paper, steel wool, wood screws, ¼ by 3-in. hanger screw bolts, oxalic acid bleach, sanding sealer, varnish, filler, stain if desired, 90-degree metal angles.


SHAPER CUT AS DESIRED
TURN END OF POST AS DESIRED
½ STOP CHAMFER
BRACES GLUED
4 - ¼ x 3 HANGER BOLT THROUGH BASES INTO TOP & BOTTOM LEGS
FEET GLUED TO BASE 45° TO CORNERS - WOOD SCREWS MAY BE USED
FIG. 1

Details of end table

Procedure

1. Make all necessary patterns. See Figures 2, 3, and 4.

2. Select stock to be used for the various thicknesses, widths, and lengths.

3. Lay out curved edges on panels; cut and finish to given sizes.

4. Saw and join post to finished square size.

5. Turn post in lathe and add stop chamfer, as shown in Figure 1.

6. Saw and join rails to finished size, curve to be laid out and cut on bottom front rail.

7. Saw and join ¾-in. plywood cores for the top and two bases to calculated size. The finished size of the core must be calculated by the student, and will depend upon how much solid border is desired to obtain the over-all size. See suggested solid border size in Figure 5.

8. Saw and join borders around cores to calculated size. Suggested finished size — ¾ thick by 2 wide by length as necessary to give finished over-all size for parts listed in step 7 and Figures 1 and 7.

9. Tongue and groove the cores and borders (see step 8) as shown in Figures 5 and 6. Miter the borders, and glue.

10. Cut mortise in post to receive panels and rails, and cut tenons on rails.

11. Sand the post, panels, and rails thoroughly, and then glue. Check continually for squareness.

12. Select plain veneer, and veneer the stock for the legs to give them added strength.

13. Select two-way or four-way center-matched veneer, and veneer the top and two bases which have previously had borders and cores attached. Step 9.

14. Lay out and cut all drawer parts to finished size (see Figs. 1, 7, and 8) making all necessary cuts after first checking paneled body for size.

15. Lay out and saw legs and feet, allowing for rasping and sanding. See Figures 2 and 3.

16. Lay out design on the top and bases, join, and shape as desired. For suggested design, see Figure 6.

17. Lay out and cut inside bottom. See Figures 1 and 7. It may be desirable to glue, or attach with wood screws, to the lower side in the center of this piece, a smaller piece of ¾ plywood to facilitate easier attachment or legs when drilling and counterboring for the hanger screw bolts.

18. Cut center drawer slide and glue in place to front rail, end, and back panels.

19. Attach the bases I and J to each other by use of glue or wood screws.

20. Body drill and counterbore inside bottom and the bases, I and J, and pilot drill legs for hanger screw bolts. The hanger screw bolts should have a threaded shank of approximately ¼ in. to receive a nut. The other end should be threaded like a lag or wood screw.

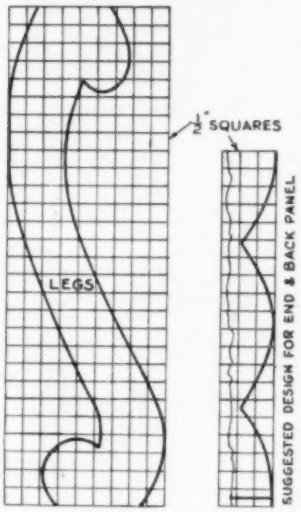


FIG. 2

FIG. 4

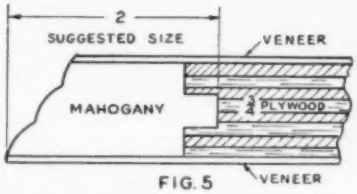


FIG. 5
SECTION OF TOP & BASES WITH VENEER

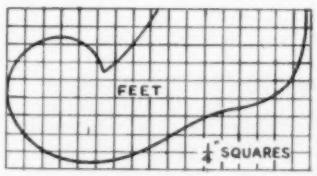


FIG. 3

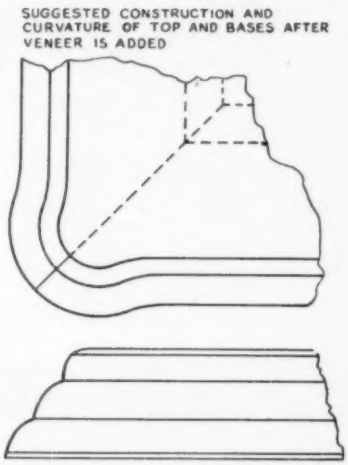


FIG. 6

PART	PART NAME	REQ'D.	ROUGH SIZE	FINISHED SIZE
A	TOP	2	¾ × 14 × 18½	¾ × 13½ × 17½
B	TOP FRONT RAIL	2	1 × 1½ × 15	⅞ × 1⅜ × 14½
C	POST	8	2 × 2 × 12	1½ × 1½ × 11½
D	DRAWER FRONTS	4	1 × 3⅜ × 14½	¾ × 3⅛ × 13½
E	CENTER FRONT RAIL	2	1 × 1 × 15½	⅞ × ¾ × 14½
F	SIDE PANEL	4	¼ × 11 × 10¾	¼ × 10 × 9¾
G	BOTTOM FRONT RAIL	2	1 × 2 × 15½	⅞ × 1⅜ × 14½
H	LEGS	4	1½ × 5 × 15	SEE FIG. 1 & 2
I	TOP BASE	2	¾ × 5¾ × 9½	¾ × 5½ × 8½
J	BOTTOM BASE	2	¾ × 9 × 13	¾ × 8¾ × 12
K	FEET	8	2¼ × 2 × 4½	SEE FIG. 1 & 3
L	BACK PANEL	2	¼ × 10½ × 15¼	⅛ × 10 × 14¼
M	INSIDE BASE	2	¾ × 10½ × 16	¾ × 10 × 15¼
N	CENTER DRAWER SLIDE	2	½ × 10½ × 16	½ × 10 × 15¼
O	DRAWER SIDES	8	⅛ × 3⅜ × 11	⅛ × 3⅛ × 10⅜
P	DRAWER END	4	⅛ × 3⅜ × 14	⅛ × 3⅛ × 13¼
Q	DRAWER BOTTOM	4	⅛ × 14 × 10⅝	¼ × 13¼ × 10⅛

FIG. 7 MATERIAL FOR TWO END TABLES

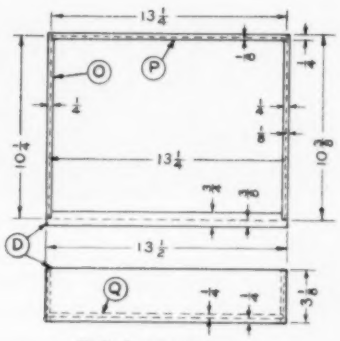


FIG. 8 DRAWER

Details of end table

21. Sand and finish all parts in *the white* to finished sizes.

22. Drill and countersink feet for brass wood screws, and attach them to the base on each corner at a 45-degree angle with the corners or center line.

23. Attach top to paneled body with small wood screws and 90-degree metal angles.

24. Glue inside bottom to post, bottom front rail, and panels. It may be desired to glue strips to the end panels on the inside above this bottom or inside the base (Part M) to which the bottom may be attached with wood screws. This can be done to make the paneled body detachable from the inside bottom, legs, bases, and feet whenever desired.

25. Attach the base portions to the legs and then fasten this assembly to the body. Triangular braces may be glued at the top of the legs and to the inside bottom for support. See suggestion in Step 17.

26. Assemble drawers. Handles may be brass antiques or specially made and attached at this time.

27. Resand and bleach to produce a uniform color in the grain of the wood. Bleach is not necessary if stain is used.

28. Fill pores if an opened grain wood is used, or several coats of sanding sealer will suffice. Use wet-dry paper or steel wool between each coat to remove superfluous sealer and prepare for the application of the succeeding coats of varnish.

29. Spray on several coats of varnish, sanding or using steel wool between each coat. Finish the last coat by using pumice and oil, and then rubbing briskly with rotten stone and oil on a soft rag. Wipe off all surplus.

30. Apply a good coat of wax and rub down.

Precautions

1. Remove all surplus glue after clamping.
2. Always make allowances in size for sanding and finishing to finished size.
3. Check frequently for squareness.
4. Observe safety first.
5. Consult drawings and procedure frequently.
6. Keep all cutting tools sharp.
7. Think before doing an operation; take your time.
8. Remember, a job worth doing at all is worth doing well.

Association News

♦ Twenty-six initiates of Theta chapter of Epsilon Pi Tau met for an oral examination, Friday night, May 13, at 7:00 o'clock in the industrial arts building of The Stout Institute, Menomonie, Wis. Each initiate was required to give a 3-minute talk, without notes, on a given professional topic. The talk, presented before a panel of faculty and Epsilon Pi Tau members, was followed by a grueling 3-minute question period.

The initiates met again Saturday morning, May 14, in room 22 to learn the results of the examinations. The following men were accepted into the chapter: Lee Bedsted, Margon Berg, Donald Braem, Donald Braun, Curtis Briggs, Hugh Capron, Sherman Dreyer, Edwin Ebert, William Fehrenbach, Robert Hanna, Ernest Haucke, John Jensen, Joseph Katalinich, Kenneth Krohn, Paul Kunz, Donald Lux, William Malone, Neil Maxa, Robert Morley, Kay T. Olsen, Harold Osborne, Duane Payleitner, Henry Peterson, William Richardson, Frank Tank, and Lowell Tuft.

The initiation team consisted of Warren Thomas, Gordon Wasinger, Robert Swanson, Robert Blaesing, and James Bohn. Stephen Grudichak and faculty members, Clyde A. Bowman and Philip Ruehl, had served previously.

Following the formal initiation the group met for a dinner, at which Clyde A. Bowman, dean of the division of industrial education, was the principal speaker. Mr. Burton Nelson, former president of The Stout Institute, was also called upon. Ernest Haucke, representing the new members, and Hugh Capron, Winona, Minn., representing members in the field, gave short messages.

♦ The South Carolina Trade and Industrial Education Association sponsored a state-wide trade contest in April, at the South Carolina Area Trade School, Denmark, S. C. There were contests in carpentry, automobile mechanics, painting, electricity, radio, cooking and baking, power sewing, tailoring, barbering, cosmetology, and shoe repair.

To encourage the youth to do higher quality of work, South Carolina has invited Mississippi and North Carolina to compete in a tri-state trade contest at the South Carolina Area and Trade School.

Next year other southern states — Georgia, Florida, Alabama, Tennessee, Louisiana, Oklahoma, Texas, Arkansas, Virginia, and Kentucky — will be invited to join the organization and help to formulate procedures and techniques for better vocational education throughout the South.

Epsilon Pi Tau Initiation at Kansas State Teachers College, Emporia, Kans.

At speakers table: Dean Ray C. Maul, Dr. O. A. Hankhammer, Prof. E. L. Barnhart, Dr. William E. Warner, President David L. MacFarlane, Orval A. Criqui

Left row (front to rear): Gordon Sailors, Willis Holmberg, Norman Ashbaugh (faculty), Melvin Cline, Kelly Mudd, Donald Blythe

Second row: Otto Eubank, Harold Butterfield, Carl Bartel, Dale Hagan (faculty), Quentin Prosser, George Rae, Rolland Alterman (guest)

Third row: Alvin Smith, Leland Jones, Jack Irwin, Donald Domann, Donald Hoffman, Marion Stevens, Dr. George Comstock (guest)

Right row: Joyce Sooter, Byron Graber, Louis Patterson, Leon Le Gresley, Morton Gunderson, and Kenneth Lenke (See item on page 28A)

WISCONSIN VOCATIONAL EDUCATION CONVENTION

The Wisconsin Association for Vocational and Adult Education held its convention on May 4 to 7, 1949, at Milwaukee, Wis.

Wednesday and Thursday were devoted to meetings of the state directors and the state staff.

The general meeting held Friday morning was presided over by Vice-President William Lathrop because President Ted Sather had met with an accident which prevented him from attending.

Evelyn M. Duvall, educator, author, lecturer, and counselor in marriage and family life, addressed the meeting on the subject "Living With Our Teen-Agers."

Eugene O'Neill, Jr., actor and commentator, followed with an excellent talk which he titled "The Professor in the Factory."

At the Friday luncheon meeting at which Raymond W. Henke, Marinette, was chairman, Richard Falk, assistant to the president, Falk Corporation, Milwaukee, spoke on "Opportunity — With or Without the Dollar Sign."

At the 2:00 p.m. Friday meeting Charles Johnson, Madison, was chairman.

P. E. McDonald, service section, General Motors Corp., Detroit, spoke on "Public School Automotive Instruction."

The local board members met at a luncheon meeting Friday at noon. The chairman for this occasion was Raymond C. Bice, La Crosse.

Wm. F. Trinke, senator, Wisconsin 22nd Senatorial District; past commander, Wisconsin Department of the American Legion; national committeeman, American Legion, addressed this gathering on "Our Country."

Friday afternoon also was devoted to many sectional meetings.

Saturday morning was given over to a general session at which Clifford P. Froehlich, specialist for training guidance personnel, Occupational Information and Guidance Service, U. S. Office of Education, spoke on "Guidance Testing."

Floyd C. Cummings, vice-president, was chairman of the meeting.

The chairman of the luncheon meeting was John A. Kubiak, president.

The speaker, George S. Speer, director of Institute for Psychological Services of Illinois Institute of Technology, Chicago, and vice-president of National Vocational Guidance Association, developed the theme "Next Steps in Vocational Guidance."

There were about 26 commercial exhibitors who showed their wares at this convention. At the Skiff program, arranged by them for the guests attending the convention, Frank C. Bruce, Jr., The Bruce Publishing Co., acted as captain.

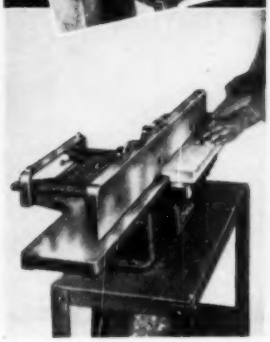
(Continued on page 20A)

ANNOUNCING THE NEW Atlas 6" JOINTER-PLANER

Has big precision ground table for work on long boards

- ★ 42" Precision-Ground Grey-Iron Table
- ★ 32" Two-Way Tilting Fence Rigidly Supported at Two Points Close to Cutter Head
- ★ Removable Cutter Head
- ★ Stationary Rear Table for Greater Accuracy
- ★ Cutter Head Raises or Lowers for Simultaneous Blade-Height Control
- ★ Exclusive Rabbeting Scale
- ★ Sealed for Life Ball Bearings
- ★ Extra Heavy Construction Throughout — Big Capacity

Fence raises for better support on vertical work



The only Jointer-Planer with a scale to set table widths. Saves time — promotes more accurate workmanship

Atlas engineers stepped far out ahead of the field for you in developing this new 6" jointer-planer. It is precision-built, and ruggedly built to take long wear in your shop. It incorporates features never before provided in a 6" jointer.

Here in the Atlas, for the first time, you get *simultaneous blade positioning!* The bearing housing caps are pivoted, and each has a screw-jack mechanism that quickly raises the cutter head so that blades, once properly ground, are *simultaneously aligned* with the tables. The rear bearing cap is easily removable so the entire cutter head can be quickly taken out and the blades resharpened *without disturbing their setting!*

Other features, exclusive on the Atlas, are the "rabbeting width scale" and the vertical fence adjustment to provide more support for working on the ends of long boards. But get all the facts about this new tool. Send a postcard today for literature. FREE Wall Charts (for your metalworking classes) will be included.

ATLAS PRESS COMPANY
971 N. Pitcher St., Kalamazoo, Mich.

Atlas POWER KING

MATCHED PRECISION TOOLS FOR WOODWORKING AND METALWORKING

Harper

PROMINENT CERAMICS INSTRUCTOR APPROVES HARPER STUDIO KILNS FOR INDUSTRIAL CERAMIC TRAINING

Mr. Edward H. Strong, capable instructor of Ceramics at the New York State College for Teachers, Buffalo, New York, is shown at extreme right with two of his students, inspecting a full load of ware in his Harper Studio Kiln, Model SK-151416. Mr. Strong says

"I have found the Harper Studio Ceramic Kiln an ideal piece of equipment for Ceramic training in the Industrial Arts field.

The kiln is well constructed, with adequate insulation and flexibility of control, to provide for proper firing and cooling cycles.

I particularly like the capacity of this kiln to operate safely and efficiently in any temperature range that may be required of it."

There is a Harper Kiln to meet the requirements of every Ceramic Department. Our Kiln Department will be glad to send you full particulars on them.

HARPER ELECTRIC FURNACE CORPORATION
1445 Buffalo Avenue
NIAGARA FALLS, NEW YORK

ASSOCIATION NEWS

(Continued from page 304)

ANNUAL SPRING CONFERENCE

The New York University School of Education held its annual industrial-arts spring conference April 29 and 30, 1949.

At the opening session, the address of welcome was given by Ralph E. Pickett, associate dean, School of Education, New York University.

Then John R. Ludington, specialist for industrial arts, division of secondary education, U. S. Office of Education, spoke on "A Modern Concept of Industrial-Arts Education."

A panel then discussed "The Principal and Superintendent Evaluate the Industrial-Arts Program." Chairman of the panel was William P. Sears, chairman, department of vocational education, New York University.

At the 12:15 luncheon G. Wesley Ketcham, supervisor of industrial arts, state of Connecticut, spoke on "Industrial-Arts Evaluation Procedures in Connecticut."

Ray E. Haines, director of instructional shops, department of vocational education, New York University, told how the industrial-arts shops at the New York University Industrial-Arts Training Center were supervised.

From 2:00 to 4:00 p.m. the visitors were conducted on a tour through a number of industrial-arts shops in various centers.

At 4:00 p.m., a panel discussed the application of craftwork and its curative effect on mentally and physically handicapped.

Saturday morning was given over to visits to industrial-arts and occupational therapy exhibits, and to various shop clinics.

Roland H. Spaulding, professor, department of vocational education, New York University, was chairman at the 12:30 luncheon, and Roy G. Fales, supervisor of industrial arts, state of New York, spoke on "Major Problems of Industrial-Arts Supervision."

At the 2:00 p.m. session a panel of which Joseph W. Slyva, vice-president, Massachusetts Industrial Education Society, Needham, Mass., was chairman, discussed "The Place of the Industrial-Arts Areas in the Whole School Program."

Carl E. Frankson, director of industrial arts, State Teachers College, Newark, N. J., gave a general summary of the entire spring conference discussions.

SPRING CONFERENCE AT OSWEGO, N. Y.

The eleventh annual spring conference of the Division of Industrial Arts Teacher Education of the State Teachers College, Oswego, N. Y., was held on May 5 and 6, 1949.

The theme for the conference was "Industrial Arts for the One Hundred Per Cent."

At the ten o'clock general meeting Dr. Harvey M. Rice, president, was the chairman.

Dr. John R. Ludington, specialist in industrial arts, U. S. Office of Education, gave an address on "Industrial Arts and the American Scene."

L. F. Livingston, manager, extension division, E. I. du Pont de Nemours & Co., gave a demonstration which really was a "Preview of Progress."

An informal luncheon followed at which Dr. Charles Yager acted as toastmaster.

The speaker at this occasion was Frank P. Johnston, chief, Bureau of Industrial and Technical Education, State Education Department, whose presentation was "Some Observations in the State Wide Program of Industrial Education."

The afternoon was devoted to exhibits and demonstrations in all shops and laboratories.

The annual industrial-arts banquet sponsored by the Epsilon Pi Tau fraternity was held at 6:00 p.m.

John York was the toastmaster at this meeting and Dr. John R. Ludington gave the main address.

The Ship's program followed the banquet.

An Epsilon Pi Tau breakfast started out the meetings on Friday.

Dr. Gordon O. Wilber was the chairman of the general meeting.

Dr. Harry V. Gilson, associate commissioner of education, State Education Department, spoke on "Industrial Arts in the School of Tomorrow."

John B. Veach, representative, Hardwood Corp. of America, gave a thought-provoking address on "The Coming Age of Wood."

An informal luncheon followed at which Dr. C. R. Hutchcroft was chairman. Wayne P. Hughes explained the "National Safety Council and Its Program." He was followed by Peter C. Furnari, Wapperingers Falls, who gave a report from the "New York State Industrial Arts Steering Committee."

NEW YORK STATE VOCATIONAL AND PRACTICAL ARTS ASSOCIATION CONVENTION

The Industrial Arts Section of the New York State Vocational and Practical Arts Association Convention held in Albany, April 19–21, played its part in making this convention one which will be remembered as outstanding. The Steering Committee of New York State Industrial Arts Clubs and Associations held an all-day session on April 19. Twenty-one of 27 groups throughout the state were represented by delegates. They participated in reports of local accomplishments, discussions of how to make the Steering Committee more meaningful to all industrial-arts teachers and accepted a number of challenges for the local groups to work on next year.

The following officers were selected to be in charge of the Steering Committee for the coming year: chairman: Edward Strong, State Teachers College, Buffalo; vice-chairman: Fred Finkeldey, Franklin D. Roosevelt High School, Hyde Park; secretary: John Hurley, supervisor of industrial arts in elementary and junior high schools, New York City; treasurer: Edward B. Parent, William Nottingham High School, Syracuse; sectional vice-president (official industrial-arts representative in the New York State Vocational and Practical Arts Association): Paul Fromer, supervisor of industrial arts in day high schools, New York City.

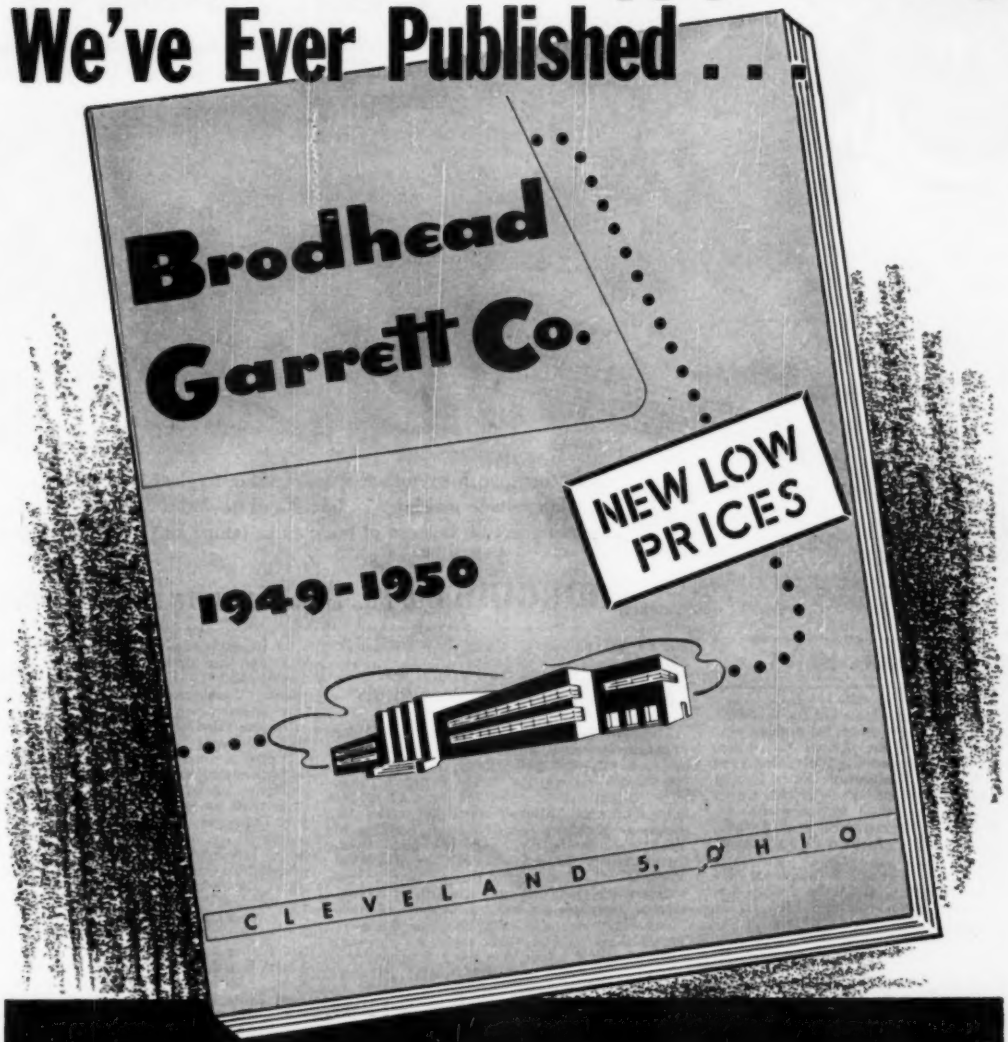
Besides attending the annual reception, the annual banquet and the two general meetings of the whole association, the industrial-arts section held the following two demonstrations and panel discussions: foundry demonstration — Fred Martuscello, Theodore Roosevelt Junior High School, Amsterdam; metal spinning demonstration — Fred A. Steinke, Philip Schuyler High School, Albany. Panel — Related Information in Industrial Arts Course: chairman: Dr. Robert L. Thompson, New York University, New York City; panel members: Dr. Gordon O. Wilber, Oswego State Teachers College; Edgar Strong, Buffalo State Teachers College; Paul Fromer, supervisor industrial arts in day high schools, New York City; Cal P. Gregway, director of vocational education, Geneva. Panel — The 60 Per Cent Life Adjustment Group: chairman: Ernest F. Frier, supervisor, secondary education, State Education Department, Albany; panel members: Howard L. Goff, principal, Columbia High School, East Greenbush; Harry B. Spencer, supervisor, secondary education, State Education Department, Albany; Garrett Nyweide, director of guidance, Vocational and Extension Board, Rockland County; Lawrence J. Heming, chairman, Mechanic Arts Department, Haaren High School, New York City; Julius C. Braun, superintendent of Schools, Salamanca.

In addition to a number of commercial exhibits and displays by various vocational and trade schools, the industrial-arts section assembled an unusually attractive display of projects representative of the wood, metal, electricity, ceramics, textiles, printing, plastics, and leatherwork done in the schools of the state. Arthur F. Ahr, state supervisor of industrial arts, was in charge of the exhibit and was ably assisted by many of the industrial-arts teachers of the Albany district.

♦ The New Jersey Vocational and Arts Association, at its convention at Asbury Park on

(Continued on page 22A)

Greatest School Supply Catalog We've Ever Published . . .



Everything In Industrial Art Supplies

- Cabinet Hardware
- Electrical Supplies
- Fine Arts Supplies
- Leathercraft
- Plastics and Findings
- Ceramics
- Soft Textured Lumber
- Wood and Metalworking Benches
- Wood and Metalworking Tools
- Sheet Metal Supplies and Equipment
- Wood and Metalworking Power Tools
- Mechanical Drawing Equipment
- Loom Weaving
- Art Metal Equipment
- Lapidary Equipment
- General Shop Books
- Metal Storage Cabinets
- Foundry Equipment

If you're not on our mailing list, send for your copy of this master catalog.

BRODHEAD-GARRETT Co., Cleveland 5, Ohio

HIGGINS Vegetable GLUE

The premier arts and crafts adhesive
. . . for SCHOOL . . . for INDUSTRY

Of light amber color, Higgins Vegetable Glue is smooth . . . strong . . . and quick to stick. Bonds any two surfaces, one of which must be

absorbent, such as cloth to wood, leather to glass, felt to metal. Useful for lampshade making . . . boxes and novelties . . . bookbinding . . . putting felt on bottom of book ends, lamps and many other objects.

ASK your HIGGINS dealer

HIGGINS INK CO., INC., 271 NINTH ST., B'KLYN 15, N. Y.

ASSOCIATION NEWS

(Continued from page 20A)

March 17, 18, and 19, 1949, elected the following officers and council members for the ensuing year of 1949–50: president, Dr. Albert E. Jochen, Middlesex County Vocational Schools; first vice-president, George W. Morgenroth, Essex County Vocational Schools; second vice-president, Esther R. Hallock, Elizabeth; third vice-president, Armand G. Rehn, Newark; treasurer, Paul M. Dare, Audubon; and secretary, Richard O. Harthmann, Jersey City.

The spring meeting of this association was held in the auditorium of the Middlesex County Vocational School, New Brunswick, N. J., on Saturday, May 7, 1949, at 10 o'clock in the morning.

The chairman of the meeting was Dr. Albert E. Jochen, newly elected president of the association, and director of Middlesex County Vocational Schools.

An address on "Industry, Services to the School," was given by Robert P. Scott, school service department of the Westinghouse Electric Corp., Pittsburgh, Pa., who explained what efforts were being made by the Educational Foundation of the Westinghouse Corporation, in its Science and Talent Search.

A meeting of the newly elected officers and council members of the association was held on Saturday, May 7, at 2:00 p.m., in the office of the director.

♦ An inauguration of a chapter of Epsilon Pi Tau at the Teachers College of Connecticut, New Britain, Conn., was held on Saturday, May 21, 1949. The new chapter will be known as Alpha Eta Chapter. The initiating team came from the State Teachers College at Fitchburg, Mass. Guests of honor included Dr. William E. Warner, Dr. Gordon O. Wilber, and G. Wesley Ketcham. The cosponsors of the new chapter will be Dr. Paul N. Wenger and William D. Chatfield. — *William D. Chatfield.*

MICHIGAN INDUSTRIAL EDUCATION SOCIETY CONVENTION

The Twenty-first Annual Convention of the Michigan Industrial Education Society was held in Grand Rapids April 21, 22, 23, 1949, with convention headquarters in the Pantlind Hotel. Other educational organizations meeting at the same time were Michigan Home Economics Association, Michigan Association of Teachers of Vocational Agriculture, and Michigan Vocational Business Education Society. Claud A. Bosworth of Michigan State College was general program chairman. He was assisted by a convention committee representing each organization. The ladies' program including the Complimentary Tea at Women's City Club, luncheons, shopping tours, and visit to the Furniture Museum, was again in charge of Mrs. Katherine Brewster Reagh of Grand Rapids.

The Thursday afternoon and evening meetings were general programs participated in by all groups. Carl Horn, director of Continuing Education Service, Michigan State College, was chairman of the afternoon meeting. The discussion topic for this meeting was "Problems of Supervision and Administration of Vocational Programs." The Thursday evening meeting for superintendents, supervisors, and directors of vocational education was presided over by Ralph Wenrich, assistant superintendent of public instruction in charge of vocational education. The panel was made up of representatives from agriculture, industry, business, labor, homemaking, and education. The topic was, "The Essential Elements of a Comprehensive Vocational Program."

A new feature on the Thursday program was the get-together dinner for commercial exhibitors at Schmidts' Cafe arranged by M.I.E.S exhibits manager, Roy W. Chamberlain.

At the convention breakfast on Friday, Roland R. Fraser, vice-president, M.I.E.S., acted as toastmaster, and C. W. Bemer, superintendent of schools, Muskegon, gave an enjoyable and thought-provoking talk dealing with the subject of human relations for which he had chosen the title, "C-Sharps."

Special features on the Friday program were demonstrations of work with plastics by Arthur Dunham, special instructor, Wayne University, silver craft by Dewey Barich, head of Industrial Arts Department, Kent State University, aluminum craft by Marshall L. Byrn, associate professor of industrial education, University of Michigan, and an exhibition of patternmaking, foundry work, and machine shop by Ford Trade School, Dearborn, Mich.

The general session commencing at 9:30 a.m. was in charge of Joel W. Lee, president, M.I.E.S, and Arthur L. Reagh, director of industrial arts, Grand Rapids, was program chairman. Dr. William J. Micheels, professor of industrial education, University of Minnesota, spoke briefly on the subject of state supervision of industrial arts. The theme of the program was "Is a State Supervisor of Industrial Arts Desirable for Michigan?" This topic encouraged a lively discussion which was summarized at the close of the meeting by Dewey Barich, Kent State University, Ohio.

The Iota Lambda Sigma luncheon with Willard Bateson of Ann Arbor in charge of arrangements was held in the Spanish Room of the Rowe Hotel, and the Western Michigan College Alumni Luncheon was in the Banquet Room of the Morton Hotel with Dr. Deyo B. Fox, director of vocational and practical arts education, Western Michigan College, presiding.

The ever popular Town Hall meeting with Earl L. Bedell, director of industrial education, Detroit, serving as moderator, got under way promptly at 1:30 p.m. Members of the panel were Donald Wheeler of Lansing, Louis Hodges,

(Continued on page 25A)

MAKE PROFESSIONAL LOOKING COPIES

A Stylus for Every Need

For illustrating, ruling, lettering, writing. New roll-point stylus for handwriting. Three dual-point, 2-in-1 styli. Designed for fast, easy use. Attractive colors for easy identification.

Many Styles of Letters and Numbers

Lettering guides of molded plastic. Greater thickness for strength, easy handling.

Attractive Shades and Patterns

Screen plates in new large size to dress up your mimeograph work with shadings in many patterns. Sturdy plastic, restful amber color.

Drafting Table Precision

The Mimeoscope ® illuminated drawing board helps you to fast, easy tracing, drawing, lettering. Shown here is the model 5 on Tiltoscope model 35 base.

Make your Teaching More Effective

Your instructions will be easier to understand—easier to follow—when each boy has his own clear copy of the lesson, outline, project, or detail sheet.

These copies can be produced quickly and economically on an A.B. Dick mimeograph. Easy duplication of anything typed, written, or drawn is only a matter of minutes with any one of A. B. Dick's many models.

• You'll find just the mimeograph you want to fit your own requirements and budget in the complete A. B. Dick line. For use with all makes of suitable stencil duplicating products. Let your nearest A. B. Dick distributor show you all the advantages, or simply send in the coupon below.

Mimeographing Is BALANCED Duplicating

Brings you all the essentials—legibility, speed, versatility, easy operation, and low overall cost—with no sacrifice of one for another.

A.B.DICK

. . . the first name in mimeographing

Mail this Coupon for more information

New Accessories make professional looking copies

A. B. DICK COMPANY, Dept. IA 949
720 West Jackson Boulevard, Chicago 6, Illinois

Please send me more information on A. B. Dick mimeographs and new accessories.

NAME_____

SCHOOL_____

ADDRESS_____

CITY_____ STATE_____

New books for vocational courses

MOTOR TUNE-UP MANUAL.

By Ralph Jay Everest

A text for auto mechanics courses by the instructor in motor tune up at the Wiggins Trade-Technical Inst., Los Angeles. Full explanation of principles as well as techniques, with especially good instruction on auto electricity. Detailed instruction on all symptoms and causes of trouble and every step in all repair and tune-up jobs. Fully illus. $5.50

RADIO & TELEVISION MATHEMATICS

By Bernhard Fischer

721 problems, with answers, arranged under radio topics, show step-by-step how to set up and solve all radio and electronic problems involving mathematics. Excellent preparation for FCC exams of all classes. A wealth of problem material for teachers of radio and applied math. $6.00

MEET THE PLASTICS

By Clark Robinson

A complete, up-to-date survey of the plastics industry, its products and their many uses, and the vocational opportunities in it. Excellent for vocational guidance. Good background for industrial arts and vocational courses in plastics. $3.75

ELEMENTARY METALLURGY AND METALLOGRAPHY

By Arthur M. Shrager

The first text on metallurgy for high school and vocational courses. Explains fully and in simple terms the science and technology of this very important branch of modern engineering. Provides a related-science course essential for welding, foundry, and all other metal-working training. $4.75

PAINTING WITH LIGHT

By John Alton

One of Hollywood's leading Directors of Photography explains the equipment and techniques of photographic lighting for close-up, interior and outdoor scenes, and all kinds of special effects. The only source of such information. 295 illustrations. $6.00

AIRCRAFT ELECTRICAL SYSTEMS, HYDRAULIC SYSTEMS AND INSTRUMENTS

By Col. Rollen H. Drake

The latest volume in the Aircraft Mechanic Series. Very clear explanations of the principles of these complex systems, their operation and installation in the modern aircraft. $5.60

Send for on-approval copies

AN OLD FRIEND SAYS *Welcome Back!*

At the start of another school year, Weldwood Glue . . . a favorite of teachers everywhere . . . is waiting to serve you.

This modern plastic bonding agent can help make your teaching easier and more effective. It can help your pupils learn faster to do better work under your instruction.

HERE ARE SIX GOOD REASONS WHY WELDWOOD GLUE CAN HELP YOU *AND* YOUR PUPILS:

1. Mixes quickly and easily with cold tap water.
2. Spreads smoothly and easily.
3. Sets fast! Joints can be light-worked a few hours after clamping.
4. Tremendous strength . . . joints are stronger than the wood itself.
5. Stain-free and resistant.
6. Bacteria- and rot-proof.

Give *your* pupils the advantage of working with Weldwood Glue. Give *yourself* the time-saving, work-saving advantages of this easy-to-use, quick-setting, tremendously strong glue.

Weldwood Glue is available in a variety of sizes and prices at your school supply house, hardware store, or lumber yard.

For full information and samples, mail the coupon.

"Teach the boys today with the glue they'll use tomorrow."

WELDWOOD
PLASTIC RESIN GLUE

UNITED STATES PLYWOOD CORPORATION
Industrial Adhesives Division, Dept. 479,
55 West 44th St.,
New York 18, N. Y.

Please send me literature and free sample of Weldwood Glue.

Name ..... Position .....

School .....

My regular supplier is .....

ASSOCIATION NEWS

(Continued from page 22A)

Grand Haven, Charles Kemp, Flint, Dr. Fox, Kalamazoo, George Peer, Mattewan, and Maurice Pancost, Lansing. Questions offered as discussion topics by the audience were:

1. How general should industrial arts be and how wide a variety of materials should industrial-arts teachers be prepared to use?
2. Will the attempt to serve the lower intelligence group have a detrimental effect on the industrial-arts program in high schools?
3. What can be done to improve the art and design aspects of industrial arts?
4. Should the M.I.E.S. hold an annual convention in conjunction with other organizations affiliated with the M.V.A. or a separate convention as in the past?
5. To what extent should the board of education furnish consumable supplies for students in industrial arts?
6. Can practical methods for co-operation between industrial arts and vocational education be devised?
7. How can industry be interpreted in industrial-arts courses?

Division meetings were scheduled for 3:00 p.m. and attendance at each was much larger than in past years. Harold J. Van Westrienen, chief of Trade and Industrial Education, state of Michigan, was chairman of the T & I Education program in the Red Room, Civic Auditorium. The theme for this meeting was "The Concept of Integration Applied to Trade and Industrial Education." Joseph R. Strobel, director of vocational education, Ohio, was introductory speaker and members of the panel representing business, education, industry, and labor were: Tom Garrity, Detroit; George Ayres, Grand Rapids; Robert Scott, Lansing; and William Farnum, Pontiac. In his summary of the talks and discussion, Mr. Van Westrienen emphasized the hope of business, industry, and labor that public education, and especially vocational education, would assume greater responsibility for acquainting youth with social, industrial, and economic conditions and problems.

Arthur L. Reagh was chairman of the industrial-arts meeting in the Black and Silver Room. The speaker, Dr. William E. Warner, professor of education, Ohio State University, said that technology had multiplied the energy available to man by 500 times during the past century and suggested that industrial-arts education be grouped under the following divisions: (1) transportation; (2) communication; (3) manufacturing; (4) power. Dr. Warner would include the study of all types of power developments up to and including nuclear fission. Following his talk, Dr. Warner and members of the panel took part in a question and answer period, and the meeting closed with a short, humorous talk by Dr. James McKinney, president, American School, Chicago.

"Security for Women in Industry Through Adequate Training" was the discussion topic for the Trade and Industrial Education for Women section. Mrs. Elizabeth King of Detroit was chairman of the meeting.

L. P. Cushman, superintendent of schools, Owosso, was toastmaster for the program of the Twenty-first Annual M.I.E.S. Banquet in the Ball Room, Pantlind Hotel. Honorary life memberships were presented to Maurice H. Pancost, principal, Lansing Technical High School, and H. Lew Webb, representative of Delmar Publishers, Albany, N. Y. The certificates were presented by Arthur L. Reagh, director of industrial education, Grand Rapids. The 1949 M.I.E.S. master teacher award in the form of a beautiful bronze plaque with suitable engraving was presented to Marshall L. Byrn, associate professor of industrial education, University of Michigan, Ann Arbor. Howard P. Skinner, chairman of the M.I.E.S. Award Committee, made the presentation.

Greetings from the State Department of Public Instruction were extended by C. L. Taylor, deputy superintendent, and the main address of the convention was delivered by Dr. Kenneth McFarland, superintendent of schools, Topeka, Kans. The title of Dr. McFarland's talk was "The 'U' in Education." The program of entertainment in the Black and Silver Room following the banquet featured the "Singing Sentinels" sponsored by Kaiser-Frazer Corporation, "Dance Numbers" by Michigan State College students, and a humorous skit, "Artisans at Work," by a group of Grand Haven Teachers. Dancing to music of DeForest Pool's Orchestra continued until 1:00 a.m.

The Saturday morning program was given over to round-table meetings under the general chairmanship of Dr. John L. Feirer, Western Michigan College, and the convention was brought to a close with the combined luncheon and Ship's Program with Claud A. Bosworth, general program chairman, in charge. Dr. Lee Thurston, superintendent of public instruction, greeted the combined organizations, and Forrest Kirkpatrick, dean, Bethany College, Bethany, W. Va., spoke on the subject "The Importance of Being Human." Vern Larsen, representative of E. H. Sheldon Company, was deck officer for the Ship's Program. He was assisted by Don Jesseman, Stanley Tools, and C. L. Messmore, International Textbook Company.

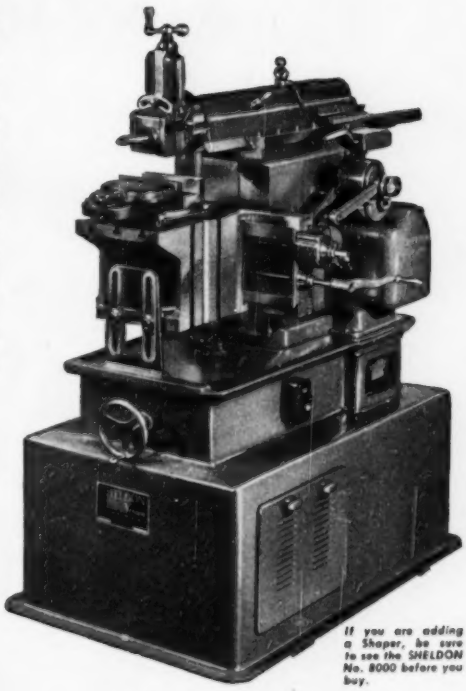
Resolutions adopted by the M.I.E.S. approved increased appropriations under the George-Barden Act for vocational education and recommended a study involving all educational organizations in the state of Michigan to determine the feasibility of establishing a Spring Institute Day to be used by educational organizations in a manner paralleling the Fall Institute Day.

(Continued on page 28A)

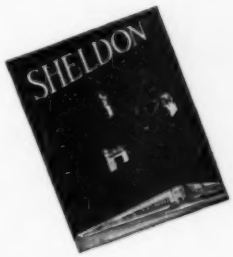
SHELDON

The right size for the school shop

The SHELDON Back Geared 12" Shaper is just the right size for the school shop. While moderate in price, it is large enough for any school project. Though modern in design, it has the features and completeness of a fine industrial shaper. It is safer than most because all controls and adjustments can be made from one operating position—there is no reaching over—and all gears, belts and moving parts other than the ram are fully enclosed, all speed changes made by an external hand wheel. It occupies only 27"x44¼" of floor space.



If you are adding a Shaper, be sure to see the SHELDON No. 8000 before you buy.



Write for Catalog

SHELDON MACHINE CO. Inc.

Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers

4244 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U. S. A.

Announcing-

POST
FALL TERM SPECIALS
A selected group of drawing instruments and supplies available for fall term delivery. Whatever your problem, purpose or need, there are no finer instruments or drafting materials than these bearing the POST Quad Trademark. When you buy or specify POST you can be sure that you are getting the best possible value your money can buy.
ALL PRICES IN THIS CIRCULAR SUBJECT TO SPECIAL SCHOOL DISCOUNT OF 25%

Check your mail — don't miss your special discount

☐ Please send copy of "Fall Term Specials"
☐ Please include my name on list to receive School Materials Catalog

NAME:_____
POSITION:_____
ADDRESS:_____

Houston • Detroit • Chicago • Los Angeles

Special SCHOOL DISCOUNTS

on POST Professional Quality

DRAWING SUPPLIES

Look to your copy of POST Fall Term Specials for all your immediate needs in drawing instruments and supplies. Whatever your problem, purpose or need, select POST Oval and be assured of receiving the best possible value for your money. Check through the Fall Term Specials. Note the most reasonable prices on quality drawing instruments for every purpose—and remember that the special school discount is in effect on practically every single item.

If you have not received your copy of POST Fall Term Specials let us know at once and a copy will be sent you immediately. Make sure your name is on our active list to receive the big new POST School Materials Catalog which will be available very soon for all your long range needs.

THE FREDERICK POST COMPANY

Milwaukee · 3650 AVONDALE AVENUE · CHICAGO 18, ILLINOIS · *Distributors in all Principal Cities*

Starrett
SATIN CHROME MICROMETERS
Eliminate Glare . . . Retard Corrosion
Increase Speed and Accuracy

Pioneered and Developed by The L. S. Starrett Co.

ANOTHER STARRETT FIRST

12 BIG FEATURES AT NO EXTRA COST

- Satin Chrome Finish — No Glare, Resists Rust
- Hi-Micro Mirror Finish — On Anvil and Spindle Faces
- Hardened Threads — Stabilized and Ground from Solid
- One Piece Spindle — Insures Long, Accurate Life
- Quick Reading — Every Thousandth Numbered
- Convenient Decimal Equivalents On Frame or Thimble
- Simple Sleeve Adjustment — Maintains Starrett Accuracy
- Precision Built — By the World's Greatest Toolmakers

ALSO AVAILABLE WITH STARRETT FRICTION THIMBLE — *RIGHT UNDER YOUR THUMB*

Now *all* Starrett Micrometers — including the popular priced Black Frame type — have the new, non-reflecting Satin Chrome Finish. No more squinting, no shifting to better light . . . the markings stand out sharp, clear and easy to read under any illumination. And eye-soothing Satin Chrome Finish is highly resistant to stains and corrosion.

Now, more than ever, be sure you specify STARRETT Micrometers.

Starrett
Standard of Precision
MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS • DIAL INDICATORS • STEEL TAPES • HACKSAWS AND BAND SAWS • PRECISION GROUND FLAT STOCK
Buy Through Your Distributor

THE L. S. STARRETT CO. • *World's Greatest Toolmakers* • ATHOL, MASSACHUSETTS, U. S. A.

ASSOCIATION NEWS

(Continued from page 25A)

Executive officers chosen by the Michigan Industrial Education Society for the year 1950 were: president, Roland R. Fraser, Detroit; vice-president, Charles Kemp, Flint; executive secretary-treasurer, Ward D. Sager, Mt. Pleasant; and exhibits manager, Roy W. Chamberlain, Grand Rapids. — *Ward D. Sager.*

♦ Mu Sigma Pi Fraternity acted as host to the vocational directors from Germany on the Wayne University Campus during the week of May 7 to 13, 1949. These men toured the United States making a study of educational programs in our country.

At this meeting these men had an opportunity to see exhibits of outstanding work in industrial education by Mu Sigma Pi members at Wayne, and heard discussions of the latest trends in this field.

♦ The Connecticut Industrial Arts Association's executive committee met at New Haven on Wednesday evening, May 6, 1949.

At that time it was decided to hold the fall convention of the Connecticut Industrial Arts Association at New Haven on Friday, October 28. The luncheon meeting will be held in the Y.W.C.A. building on Howe Street at 12:30 p.m. The theme of the convention will be: "Evaluating the Modern Program Through Industrial Arts."

John Stapleford of Basset Junior High School, New Haven, is the program chairman.

The Spring Conference of the Connecticut Industrial Arts Association will be held at New Britain Teachers' College on March 24 and 25, 1950. The theme of this meeting will be: "School Shop Layouts and Equipment."

Help improve our standards of education by attending these meetings.

♦ A banquet was held in connection with the installation of Alpha Epsilon chapter of Epsilon Pi Tau on the Kansas State Teachers College campus, Emporia, Kans., on April 9. Nineteen men were initiated into the chapter, including 12 students, 2 faculty members, and 5 alumni. The initiating ceremony was held in the Student Union building with an initiating team from the Alpha Alpha chapter, Pittsburg, Kans., composed of J. Kelly Mudd as the Honorable Basileus, George S. Roe as Texnikh, Marion P. Stevens as Pragmateia, Morton A. Gunderson as Exetasis, Gordon B. Sailors as Hegemon, Carl R. Bartel as Phylax, and Joyce M. Sooter as Historiagraphos. Dr. William E. Warner, National President of the fraternity, discussed the National Program. See picture on page 304.

Following the initiation ceremony, a banquet was held. Prof. E. L. Barnhart, head of the industrial-arts department, Kansas State Teachers College, Emporia, Kans., served as toastmaster. President David L. MacFarlane gave the welcome, followed by an address by Dr. O. A. Hankammer, head of the industrial-arts department of Kansas State Teachers College, Pittsburg, Kans., and Governor of the Plains Area of Epsilon Pi Tau. His subject was "The Role Played by Epsilon Pi Tau." Dr. William E. Warner then gave the Charter Presentation address, and presented the charter to Dr. Ray C. Maul, dean of the College, who in turn presented the charter to Orval A. Criqui, president-elect of Alpha Epsilon chapter. After a response, the guests and initiates adjourned to the radio lounge for an informal reception.

♦ Officers of the Essex County Vocational and Technical Teachers Association for the year 1949–50 are: president, R. Neal Owens; first vice-president, Henry P. Hilkens; second vice-president, Edward Nuggent; recording secretary, Joseph McCoy; treasurer, Harry B. Sutton; corresponding secretary, Lillian M. Gardner.

♦ The 1949–50 officers of the Central Connecticut Industrial Arts Association are: John Fuller, president; Thomas Pascoe, vice-president; Richard B. Smith, secretary; and Harry Arnini, secretary.

Personal News

WILLIS B. ANTHONY DIES

Willis B. Anthony, 72, who inaugurated the program in the United States for training teachers of industrial arts, died recently in Burbank Hospital, Fitchburg, Mass. Mr. Anthony had retired February 1, 1947, after serving on the faculty of Fitchburg Teachers College for 38 years.

Mr. Anthony, who came to Fitchburg in 1909 to teach shop to seventh- and eighth-grade boys in the junior high school, instituted the initial practical-arts training program a year later. Due to his efforts the industrial-arts building was erected on the college campus, a model for similar building throughout the country.

More than 600 young men were trained in practical arts under Mr. Anthony's tutelage. He was said to be the first educator to bring tradesmen onto the faculty to teach shop classes, and in recent years, he had set up a program whereby more young men than ever before could specialize in industrial arts. The action was prompted by the desire of a large number of war veterans who indicated an interest in that type of work.

He was the founder of the New England Industrial Arts Teachers' Association, which was organized in Fitchburg, Mass., in 1935, and which was the first major organization of its kind in the country. He served as executive secretary of

(Continued on next page)

PERSONAL NEWS

(Continued from previous page)

the association for many years. Through his efforts, Epsilon Pi Tau, national honorary society, was established at Fitchburg State College.

After being graduated from high school in Adams, Mass., his native town, Mr. Anthony spent four years at the Massachusetts Normal Art School in Boston. He taught designing, drawing, and shopwork during his nine years in the public schools and in the State Normal School at North Adams.

Instead of accepting the position of state supervisor of drawing in Massachusetts which he had been offered, he came to Fitchburg Normal School and started to put the shopwork, given to seventh- and eighth-grade boys in the new training school on the campus in Fitchburg, on a more practical basis than was being done elsewhere.

His articles in educational journals helped to give prominence to the department's innovations, and the school's unit was established on a four-year degree-granting basis. The Industrial Arts Department in Fitchburg was one of the first in the country to grant the bachelor's degree to its graduates. Later graduate courses were conducted and master's degrees were awarded in the field of industrial arts.

WILLIAM R. BAKER DIES

William R. Baker, 56, head of the department of graphic arts and professor of industrial education at The Stout Institute, Menomonie, Wis., died at a St. Paul, Minn., hospital on June 7, 1949.

A faculty member at Stout since 1933, Mr. Baker was long associated with the graphic arts

William R. Baker

and graphic arts education. He was born in Rockford, Ill., and after completing high school, attended the Illinois State Teachers College, DeKalb, Ill., from which he was graduated in 1913.

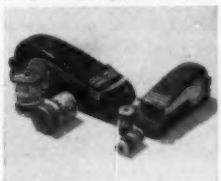
Mr. Baker was a printer by trade and a teacher of printing by profession. He taught at high schools in Fairbury, Ill., Rockford, Ill., Sioux City, Iowa, and Waukegan, Ill., before becoming a member of the Stout faculty in 1933. During his teaching career he attended several trade schools and colleges, received his B.S. degree in 1925 from The Stout Institute and a M.A. degree from the University of Minnesota in 1936.

Always abreast of the latest developments in the field of graphic arts, Mr. Baker was an active member in several national trade and educational societies. He was a member of Epsilon Pi Tau, Phi Delta Kappa, Stout Typographical Society, National Education Association, Wisconsin Education Association, Wisconsin Vocational Association, National Association of Journalism Instructors, National Association of Industrial

(Continued on next page)

The new Behr-Manning SPEED-GRITS® sander

QUICK-LOADING FEATURE
The SPEED-GRITS Sander loads like a camera — but easier and faster. You simply raise the clamps, insert a roll of sandpaper in the magazine and pull the end of the roll out through the slot. You clamp it back tight in an instant.



ECONOMICAL REFILL ROLLS
Behr-Manning SPEED-GRITS Refills are economical to use and of ample length to give plenty of service without refilling. Refills for #12 come in a wide variety of grits and in the finest quality ADALOX® and DURITE® Paper and in METALITE® Cloth. ADALOX Paper is available for #6.

This light-weight plastic, easy-to-grasp tool handles like a plane and makes sanding and finishing faster and easier. It grips the sandpaper snugly and tightly and won't let it loosen, snag, slip or tear.

Moreover, the SPEED-GRITS Sander makes it easier to get a professional finish. A flat, rubber contact pad, securely cemented to the bottom of the Sander, provides a resilient backing for the sandpaper that is impossible to obtain with the old-fashioned wooden block.

Budget-conscious shops will appreciate the SPEED-GRITS Sander for its economy. The #12, with a sanding area of about 7" x 2", costs only $1.25. The smaller #6, with a sanding area of 5" x 1⅜" is only $1.00.

Order a supply of these handy, economical SPEED-GRITS Sanders now. They'll help your students do a better job and speed their projects.

BEHR-MANNING · TROY, N.Y.

NORTON abrasives

QUALITY COATED ABRASIVES SINCE 1872

Your students will do better work with the

AUTOMATIC DRILL

MILLERS FALLS TOOLS
SINCE 1868

Formerly "Mr. Punch" and now improved with a new chuck, the Millers Falls No. 185A is the world's favorite tool for boring small holes. School-shop instructors know that good tools inspire good work. That's why so many back up their teaching skill with this famous Automatic Drill.

Its design combines every desirable push drill feature. Its sturdy, smooth-acting mechanism is simple and rugged. Its gleaming, high-polish nickel finish withstands corrosion indefinitely.

The finely knurled handle contains 8 new style drill points from 1/16" to 11/64". Each has its own separate compartment and is quickly selected by a twist of the rotating cap.

Make the Millers Falls No. 185A your shop's standard Automatic Drill. Order from your supplier today.

Millers Falls Company

GREENFIELD • MASSACHUSETTS

PERSONAL NEWS

(Continued from previous page)

Teacher Trainers, Wisconsin Printing Teachers Association, Collegiate Press Association, and the National Graphic Arts Guild.

Mr. Baker was a pioneer in the field of printing and graphic arts education, and believed that the subject has a place in all secondary education.

HOMER C. ROSE IN NEW POSITION

Homer C. Rose has accepted a position as Assistant Head, Standards and Curriculum Branch, Training Division, Bureau of Naval Personnel, Washington, D. C.

The new position calls for the co-ordination of work done by the sections of the branch in the areas of instructor training, curriculum construction, training aids development and utilization, textbook writing, correspondence course construction and administration, and promotion examination development and administration.

For the past three years Mr. Rose has been in charge of the Curriculum and Instructor Training Section of the Branch. To accept this position under Civil Service, Mr. Rose was released from active duty as a lieutenant commander in the U. S. Navy.

During the early phases of the war, he was employed by the army at Fort Knox, Ky., in one of the first major instructor training programs for the military service. Following this, he was trained as an enlisted man in the army and was released in 1944 to accept a commission in the navy. As a naval officer he organized instructor training programs principally with the Amphibious Training Command, Atlantic Fleet.

Prior to the war, as a member of the faculty at Southern Illinois University, Mr. Rose trained teachers for the field of industrial education.

Mr. Rose is a graduate of The Stout Institute and Iowa State College.

M. REED BASS HONORED BY THE V.F.W.

M. Reed Bass, director of the David Ranken Jr. School of Mechanical Trades, St. Louis, Mo., was presented with the annual "Outstanding Citizen's Award" at the Soldiers' Memorial in St. Louis on June 17, 1949. Selected as the recipient for 1949 by the VFW, Eleventh District, Department of Missouri, he was cited for his constant concern for the welfare of disabled veterans and for the boundless energy he displays continuously in working for their interest.

Although he is no longer young, Mr. Bass retains his position of eminence and leadership in his special field. He has been elected to the presidency of the Missouri Industrial Education Society for the coming year, and is an active participant in a great number of educational and civic organizations. Besides this, his advice and assistance are constantly being sought, and he continually works with special groups for the good of vocational education. — *Hal Gilker.*

M. Reed Bass, director of the David Ranken Junior School of Mechanical Trades, St. Louis, Mo., receives a plaque from P. Donald Fisher, senior vice-commander, 11th district V.F.W. To the right is W. Lee Herron, the commander, who witnesses the presentation

Chester L. Messmore

CHESTER L. MESSMORE, THE NEW CAPTAIN OF THE SHIP

Chester L. Messmore, manager of the school division, International Textbook Company, Scranton, Pa., has just been elected captain of The Ship. This is a national organization of representatives of more than one hundred reliable commercial firms doing business in the educational field. These firms exhibit their products at many state and national conventions.

Mr. Messmore has served as purser of The Ship for a number of years. The term of captain

(Continued on next page)

PERSONAL NEWS

(Continued from previous page)

is for two years and upon retirement, he is elected to the honorary rank of Commodore.

Others that have served in the capacity of captain of The Ship are: Frank Phillips, Waldo Wright, Ralph L. Newing, George Farnham, Paul Goward, Gordon James, Bill Milliken, Robert Gemmell, Charles Roper, Al Opie, and Bert Cholet.

♦ DR. WILLIAM T. BAWDEN, director of publications at Kansas State Teachers College, Pittsburg, Kans., attended the fifty-third annual reunion of his graduating class at Granville, Ohio, in June. He was, at that time, awarded a "Denison University Citation." The citation was awarded in recognition of outstanding achievements and services which reflect honor upon Denison University. The award was made at a special alumni luncheon.

♦ HAROLD R. DANFORD resigned as educational director of the Accident Prevention Department of the Association of Casualty and Surety Companies, effective July 1.

MARLAND K. STRASSER was appointed to take his place.

♦ DR. CARL C. FORSAITH, one of America's first wood technologists, has retired from the faculty of the New York State College of Forestry, Syracuse, N. Y., after 32 years of service in forestry education. He left the college June 30 to live on his farm birthplace near Auburn, N. H.

♦ HENRY J. STUBBA has been appointed director of industrial education in the Passaic, N. J., public schools. A graduate of Buffalo State Teachers College, Mr. Stubba received his bachelor of science and master of education degrees from Rutgers University. He has served as assistant principal and principal of the Memorial Junior High School in Passaic. Mr. Stubba will supervise a comprehensive survey of the industrial-education division of the Passaic public schools.

♦ JOSEPH R. STROBEL, Ohio State Director of Vocational Education, was honored with the degree of doctor of education by Western Reserve University, Cleveland, Ohio, on February 2, 1949.

Dr. Strobel began his professional work at The Stout Institute, Menomonie, Wis., and received his B.S. and M.A. degrees at Western Reserve University. He completed other graduate work at Teachers College, Columbia University, and Cornell University. Prior to his appointment as State Director of Vocational Education in 1945, he served as State Director of Vocational Training for War Production Workers.

♦ KENNETH MORTIMER has been named instructor in mechanical engineering at Illinois Institute of Technology. The appointment is effective September 1.

♦ WILLIAM H. SCHEICK, co-ordinator of the Small Homes Council at the University of Illinois, has been granted a year's leave beginning September 1, to serve as the first executive director of the newly organized building research advisory board in Washington, D. C. The board was organized by the National Research Council and operates under its jurisdiction.

♦ EDWARD L. J. MCDOWELL has been named instructor in mechanics at Illinois Institute of Technology.

Mr. McDowell received his bachelor's degree at Illinois Tech in 1946. He is now completing work toward a master's degree.

♦ HARRY STARKEY has been made head of the industrial-arts department at the high school in Great Bend, Kans.

♦ DR. PAUL E. HEMKE has been appointed dean of faculty at Rensselaer Polytechnic Institute, Troy, N. Y., succeeding Dr. Matthew A. Hunter, who has reached the retirement age. Dr. Hemke, head of the Department of Aeronautical Engineering since 1936, was selected by the U. S. Army at the conclusion of World War II to head a scientific mission to England and Europe for the study of captured German documents and equipment in the field of aeronautics.

Dr. Hunter, retiring faculty dean, has served in that office since 1944, was formerly head of the departments of metallurgical engineering, electrical engineering, and physics, and is well known for his research and consulting work in metallurgy.

♦ C. J. (CLIF) HENDRYX, former manager and branch and sales supervisor of the Southeastern states of the E. C. Atkins & Co., Indianapolis, Ind., has retired. He will be greatly missed by his co-workers and his legion of friends and customers.

♦ DR. HOMER J. SMITH, at the end of the spring quarter at the University of Minnesota, left for the west coast where he taught for eight weeks at the University of California, Santa Barbara College. He also attended the Annual Vocational Supervisory Conference in Texas. In the meantime, Dr. William J. Micheels has been in charge at Minnesota.

♦ ALBERT J. FEIRER has been appointed director of trade and industrial education for the territory of Hawaii.

♦ LUCIAN PAULUS has been appointed supervisor of industrial arts for the territory of Hawaii.

♦ JAMES C. EADIE, driver education instructor, High School, Walden, N. Y.; S. KIRKLEN COLLINS, research associate, center for safety education of the Association of Casualty and Surety Companies, 60 John St., New York 7, N. Y.; and EDWIN WIEST, driver education instructor, Newton High School, Newton, Mass., participated in safe driving institutes for teachers by the accident

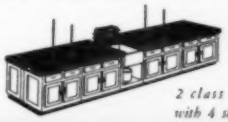
(Continued on next page)

SHELDON

Complete Planning and Complete Implementation is the Secret of Well Equipped Rooms

Good planning—planning which is in step with today's teaching theories—is essential. Equally important, however, is the production of practical and economical physical equipment required to give teaching theories the opportunity to function. In the building and installation of equipment, the ability of the equipment manufacturer to understand and appreciate what is practical, as well as essential, is of prime importance.

Sheldon's long and varied experience in planning, production and installation has time and time again proved its practical and economical value. When you plan with Sheldon and follow-through with Sheldon, you too will appreciate the ease with which teaching requirements may be satisfied.



2 class Physical Chemistry Table with 4 student positions.

World's Largest Exclusive Manufacturer of Laboratory and Educational Equipment

E. H. Sheldon & COMPANY
MUSKEGON, MICHIGAN

Brand New!

VISUAL AIDS

WEAVER and BOLLINGER

Director of Training, and Professor of Industrial Teacher Training, New York State Department of Education.

This new book, published in August, shows how to construct and use all visual aids — charts, graphs, models, film strips, motion pictures. This is a practical approach to the visual aids problem, full of new ideas and well-tested suggestions which have been developed and applied in the classroom. Illustrations are unusually generous and helpful. Special sections on sources of materials and equipment. All examples of visual aids and their uses are drawn from the field of vocational education. *Let us send you this book on 30-day approval now.*

Fall Stand-bys

HOME CRAFTS HANDBOOK — *Haines.* Also available in 7 small books.

MATHEMATICS OF THE SHOP — *McMackin and Shaver.* Excellent Second Edition.

MACHINE SHOP THEORY AND PRACTICE — *Wagener and Arthur.* Officially adopted for the Ford Motor Company Training Department.

SWOOPE'S LESSONS IN PRACTICAL ELECTRICITY — *Hausmann.* 18th Edition.

TELEVISION SIMPLIFIED — *Kiver.*

TELEVISION AND F-M RECEIVER SERVICING — *Kiver.*

HOME MECHANICS HANDBOOK — *Haines.* Also available in 6 small books.

ELEMENTARY RADIO SERVICING — *Wellman.*

Van Nostrand

250 FOURTH AVENUE, NEW YORK 3

PERSONAL NEWS

(Continued from previous page)

prevention department of the association during the summer months.

♦ OWEN W. KEELING, with a B.S. degree from the Texas A. & M. College, is teaching industrial arts in the Greenville, Miss., high school.

♦ WILLIAM F. MAHAFFEY, B.S. degree from Texas A. & M. College, is teaching cabinetmaking at the Junior College, Laredo, Tex.

News Notes

GOLDEN ANNIVERSARY EXHIBIT AND OPEN HOUSE

On Wednesday, May 18, 1949, the public schools of Kalamazoo, Mich., held a one-day exhibit and open house to commemorate the introduction of manual training in the curriculum of the Kalamazoo public schools.

Homemaking, education, industrial education, and fine arts, co-operated to make this anniversary celebration a success. Present supervisors of homemaking, industrial education, and fine arts, are: Miss Beulah M.ikle, Archie P. Nevins, and Miss Marion Andros, respectively.

A reception was held in honor of former teachers of these various departments. Those honored were: Charles G. Wenzel, Walter W. Wheater, Alba Hill, Miss Jessie S. Walton, Mrs Helena Barker, Mrs. Gilman Lane, Mrs. Harry Howick, Miss Fillette Many, Albert H. Holmes, Frank Burt, Mrs. R. R. N. Gould, Mrs. Daisy Howe Kilgore, Miss Marion Russell, Mrs. Neil Chamberlain, Miss Beulah Wadsworth, and Gilman Lane.

♦ Miami University alumni and friends are planning to honor and perpetuate the work and memory of Dr. Fred C. Whitcomb, through an Industrial Arts Education Scholarship at Miami University, Oxford, Ohio.

The University board of trustees has expressed its appreciation of his services to the university and to education through the naming of the industrial-arts education building in his honor.

A minimum goal of $2,500 has been set for this undertaking. This amount would, if invested in the irreducible debt of the state of Ohio, yield an annual scholarship of $150.

♦ Castle Films, 1445 Park Ave., New York 29, N. Y., have issued a new catalog listing films for school and industry (16mm. motion picture and 35mm. film strips) on the subjects of machine-shop work, engineering, automobile operation and maintenance, farm work, foundry work, ship building, woodworking, patternmaking, electrical work, sheet-metal work, aircraft work, aircraft maintenance, plastics, refrigeration service, and nursing.

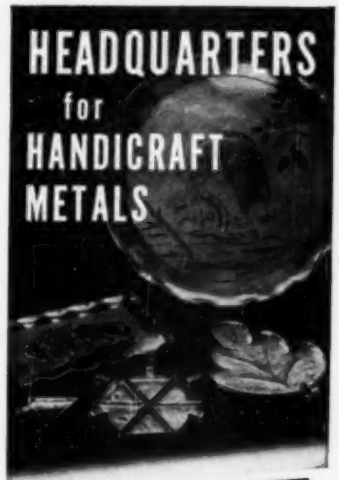
Listed also are films on agriculture, the armed forces, and other governmental services.

♦ The school system of Little Falls, Minn., added a vocational bricklayer's course in co-operation with the state department of education; joint apprenticeship committee of Brainerd, Little Falls, and St. Cloud, Minn.; and the associated general contractors of Minnesota. Each student enrolled was sponsored by the contractor who guaranteed to employ him.

♦ Membership in the American Council on Education committee on vocational education, a group reviewing qualifications of professors and advanced research scholars participating in the foreign educational exchange program set up under the Fulbright act, has been accepted by Dr. Verne C. Fryklund, president of The Stout Institute, Menomonie, Wis.

Other committee members working on the vocational education aspect of the exchange pro-

(Continued on next page)



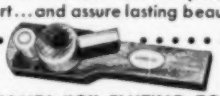
ALUMINUM and COPPER CIRCLES

Clean, pre-cut, quality metals ready to be made quickly into attractive trays, coasters and other useful items. Priced to fit your budget!

BRACELET BLANKS and

RECTANGULAR SHEETS

Of Aluminum, Brass, Copper and Stainless Steel... these popular, easy-to-work metals will give your handicraft work a perfect start... and assure lasting beauty.



"HANDI-JIG" FLUTING TOOL can add attractive fluted edges ... easily and quickly. Send for order blank.

Write today — for information and prices on the handicraft metals you need!

The booklet "Making Aluminum Trays and Coasters" and the "Copper Metalcraft" bulletin are yours for the asking. Send for them today.

METAL GOODS CORPORATION

Dept. IA

5239 Brown Ave., St. Louis 15, Mo.

NEWS NOTES

(Continued from previous page)

gram are Dr. Homer J. Smith, professor of industrial education at the University of Minnesota; Earl L. Bedell, director of vocational education, Detroit; Dr. Raymond Gregory, assistant commissioner, U. S. Office of Education; E. E. Erickson, director of industrial arts, Santa Barbara College; Dr. Edwin A. Lee, dean of education, University of Southern California; Maris M. Proffit, retired specialist in industrial education, U. S. Office of Education; and James Eddy, professor of vocational education, University of Texas.

♦ Report No. R1705 on "Bleaching Wood," issued by the Forest Products Laboratory, U. S. Department of Agriculture, Madison 5, Wis., contains interesting information on bleaching, bleaches, and methods of using.

The 8-page report also contains a bibliography of manufacturers of bleaching preparations.

♦ Occupational Briefs for the armed forces, display workers, filling station workers, merchant marine, bookkeepers, cashiers, and accountants have been made available by Science Research Associates, 228 S. Wabash Ave., Chicago 4, Ill. These briefs can be obtained at $5 per year (50 issues).

♦ Donald F. Hackett, head, industrial arts department, offered a one-day clinic for industrial-arts teachers, principals, and superintendents on the campus of Georgia Teachers College, on June 8, 1949. The purpose of the clinic was to present some of the teachers with new teaching materials and to show the principals and superintendents how an industrial-arts program may function with a minimum expenditure for tools and materials.

The subjects treated included freehand drawing, Keene cement craft, leathercraft, photography, and tin-can projects.

♦ Veterans Administration conducted a management Training Institute for selected potential executives. Outstanding experts from private industry acted as instructors and lecturers.

Thirty-eight employees from various branch offices and district offices attended the first institute.

♦ A new Occupational Abstract titled "Statistics," is now available from Occupational Index, Inc., New York University, New York 3, N. Y., for 50 cents a copy, cash with order. This abstract was written by Josephine McGinness and contains occupational information of value to the high school counselor and student.

♦ Bound volumes of the Occupational Index for 1948 are now ready for distribution through Occupational Index, Inc., New York University, New York 3, N. Y. for $10 a copy.

This volume contains over 400 annotated references on more than 600 different occupations. It includes all of the well-known career fields as well as many new and unusual occupations in its subject index.

♦ "Power Capacitors," an engineering book for industry, by Ralph E. Marbury, nationally known authority on capacitors, has just been published by McGraw-Hill Book Co., Inc., New York. The book is devoted to the use of capacitors on power circuits. The price of the book is $3.50.

Chapter headings of "Power Capacitors" are as follows: (1) Capacitor Materials and Characteristics; (2) Capacitor Rating, Design, and Manufacture; (3) Industrial, High-Frequency, and D.C. Power Capacitors; (4) Application of Shunt Capacitors to Industrial Power Circuits; (5) Application of Shunt Capacitors to Utility Systems; (6) Fuses, Switches, and Connections Used with Shunt Capacitors; (7) Automatic Control of Capacitor Kvar; (8) Series Capacitors for Line-Reactance Compensations; (9) Series Capacitors Directly Applies to Specific Industrial Loads; (10) Capacitor Installation and Maintenance.

Over 100,000 of Kester flux-core Solder Types and Sizes Available

Standard for Industry Since 1899

Every student should be acquainted with the following facts about Kester Flux-Core Industrial Solders. Made with a single core or opening. 68 different strand sizes available. Core sizes ranging from an opening that contains ½ of 1% to 7% of flux by weight. All practical alloys ranging from all lead to all tin. 8 types of major fluxes.

POSITIVE FLUX UNIFORMITY

LABORATORY CONTROLLED

FREE: Kester's New Technical Manual

"SOLDER and Soldering Technique." A complete analysis of the properties and application of soft solder alloys and soldering fluxes. Get your copy now.

1899 50th Anniversary 1949

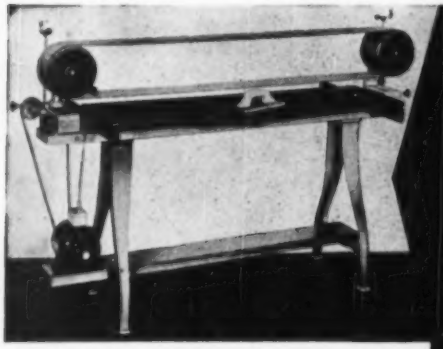
KESTER SOLDER COMPANY

4201 Wrightwood Avenue, Chicago 39, Illinois

Factories Also at

Newark, New Jersey • Brantford, Canada

KESTER SOLDER



The LOWEST COST, MOST COMPACT, Mill-Type, Hand Stroke BELT Sander-Grinder

BOICE-CRANE NO. 1165

Designed for quick sanding of all woods and polishing and fine surface finishing of industrial materials such as steel, aluminum, brass, copper, plastic, fibre and zinc. Also serves as a drum sander on contours or irregular shapes. In many shops this machine handles 75% to 85% of all sanding, grinding and polishing on flat and contour parts.

The work is always face up, which lessens the danger of taking off too much material and spoiling the part. No time lost turning the part over to check results.

Instant operator control permits anything from light "spot" touch-ups to deep "all-over" cuts. The free rolling of the work table, plus hand stroking, results in a satiny finish surface. This rolling work table furthermore permits handling material up to 36" wide, impossible on any machine without this feature.

Drums: 10" diameter. 7" wide. Shell Type. Spun Steel.
Work Table: 18" x 60"
Table Fore and Aft Travel: 18"
Abrasive Belts: 6" wide. Cloth Back.
Maximum Capacity: Areas 36" wide x 60" long to 4" thick.
(Unlimited length capacity on stock 12" wide or under)

BOICE-CRANE FRICTION-MATIC WET TOOL GRINDER

Sharpens hand tools without danger of damage to tools or personal injury. Simplified self-adjusting friction roll drive. Peripheral speed remains constant as wheel wears. No water thrown on operator. Permits proper pressure control. Operator takes a comfortable standing position and works on top of the wheel. Large tool rest, the first with adequate adjustment.

BOICE-CRANE COMPANY
932 Central Ave., Toledo 6, Ohio
Please send free literature on Boice-Crane's
☐ Spindle Sander-Grinder ☐ Wet Tool Grinder ☐ Complete line
☐ Bulletin on Tru-Form Relief Cutters for Shapers
Name .....
School .....
Street .....
City & State .....

BOICE-CRANE POWER TOOLS

- Designed for ready adaptability to a wide range of projects, fewer machines are needed to fill all your requirements.
- As nearly 100% safe as modern devices permit.
- Of middle or intermediate capacity — not too big, not too small — just the right size for school shops, they permit efficient layouts.
- Durably constructed, they can take a beating which would incapacitate most machines.

New Publications

Rural Arithmetic

By Orville L. Young. Cloth, 303 pp., 5½ by 8¼ in., illus., $1.96. The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis.

A high school text which presents a rather complete functional preparation for future farmers. It covers problems that would be encountered by those who have to plan farm crops; deal with livestock, poultry, farm mechanics, fertilizers, and orchards; or plan farm buildings and homes.

Vocational Education in a Democracy

By Chas. A. Prosser and Thos. H. Quigley. Cloth, 575 pp., 6 by 8½ in., $6.50. American Technical Society, Chicago, Ill.

The first edition of this book was written in 1925 by C. A. Prosser and C. R. Allen. The present edition, besides bringing the subject matter up to date, was undertaken as a mark of respect and esteem for Skipper Allen.

Both the first and the second edition represent the work of outstanding men in the fields of vocational education.

The book describes the nature, need (socially and economically) of vocational education, and discusses the difference between the professional specialist and the specialized worker; also the fallacy that all we need now is to educate for proper use of leisure.

The present theories of vocational education, types of full-time and part-time vocational schools, and adult education, and educational and vocational advisement are all thoroughly discussed.

Bricklaying

Plastic bound in paper covers, $2.75; cloth bound, $3.75, 216 pp., 8 by 10¼ in., illus. Delmar Publishers, Inc., Broadway and Orange St., Albany 7, N. Y.

This is a New York State Vocational and Practical Arts Association Publication which was prepared in co-operation with the Structural Clay Products Institute. It presents the things that a bricklayer must know as well as those that he must be able to do, in a simple straightforward manner.

A total of 14 units are contained in this text. Each unit presents the objective of the work covered by the unit, the related information, an assignment, and questions for discussion. There is also a list of selected references at the end of each chapter.

Our Industrial Age

By H. M. Boodish and Everett Augspurger. Cloth, 390 pp., 6¼ by 9¼ in., illus., $2.60. The McGraw-Hill Book Co., New York City.

A text for the social studies class. It presents the students with the underlying basis upon which our civilization is set up.

It pictures how our industrial system was started, and how our present-day business and production practices were developed. Also how economic and social changes affect the individual and what safeguards he has to protect his rights and those of the other members of society.

Direct-Current Armature Winding: Theory and Practice

By Charles S. Siskind. Cloth, 149 pp., 7⅜ by 10⅛ in., illus., $3. McGraw-Hill Book Co., New York City.

A text which presents the principles of d.c. armature winding in a simplified manner that makes a rather complicated matter quite understandable.

The book presents many worked-out problems that will help both student and journeyman mechanic to understand this subject much better.

Motor Tune-Up Manual

By Ralph Jay Everest. Cloth, 355 pp., 5¾ by 8½ in., illus., $5.50. The Macmillan Co., New York City.

A useful text for student and practical mechanic with an understanding of the principles of the mechanical and electrical parts which make up the modern automobile.

Methods of testing and testing instruments are clearly explained so that the motor tune-up adjustments may be effectively made in the shortest possible time.

How to Make Modern Jewelry

By Charles J. Martin and Victor D'Amico. Cloth, 96 pp., 7¾ by 10¼ in., illus., $2.50. The Museum of Modern Art, New York, distributed by the International Textbook Co., Scranton, Pa.

A text for the beginner. The book shows how to perform each operation by means of photographs.

The authors have written the book in such a manner that the book may be used for self-instruction. Included also is a list of manufacturers and dealers who handle the tools and materials that are needed.

The subjects covered are: repoussé, wire pins and ornaments, etched design, pierced work, appliqued wire and metal design, rings, stamped decoration, rings with stone settings, wire drawing, chain and tube making, and the making of necklaces and bracelets.

There also is a chapter on annealing, hard soldering, oxidizing, pickling, and polishing. Di-

(Continued on page 37A)

Just Off the Press!

A new

TEXT in PATTERNMAKING

By Alexander V. Hanel

Instructor of Patternmaking, Boys' Trade and Technical High School, Milwaukee, Wisconsin

Here is a new, complete, and teachable basic textbook in patternmaking. It is the product of the author's experience as an industrial patternmaker and instructor of patternmaking. In it are covered all basic principles, processes, and procedures for both schools and industry.

The subject matter is carefully organized and divided into two parts: the first part presents information on related subjects, tools, and equipment commonly used by the patternmaker who works in wood, while the second part consists of jobs which are aimed to give the student training in fundamentals, skills, and procedures in logically graded sequence. Every important point and step in patternmaking is illustrated either with a drawing or photograph.

The teacher need not be an expert patternmaker to teach the subject from this text.

TEXT IN PATTERNMAKING is a complete basic course in patternmaking for high schools, part time and full time vocational schools, apprenticeship and evening school classes.

Ready September 15

THE BRUCE PUBLISHING CO.
709 Montgomery Bldg.
Milwaukee 1, Wis.

New Texts To Serve Your Needs

DELMAR Publications — Industrial • Technical

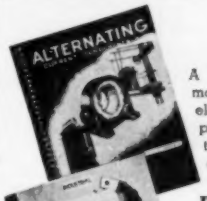
216 pages . . . $2.75
DeLuxe Clothbound $3.75

BRICKLAYING

Prepared with the cooperation of the Structural Clay Products Institute. This new publication emphasizes the coordinated development of Related Technical Information with the Manipulative Skills of the Trade. Each unit includes (1) Related Information consisting of Masonry Materials; Tools, Equipment & Safety; Trade Mathematics, Estimating; Trade Drawing; Details of Construction; and, Shop Practice, including Suggested Job Projects. A first year course for the Bricklayer apprentice or student.

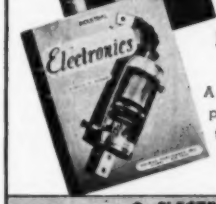
● CARPENTRY SERIES

HAND TOOLS AND PORTABLE MACHINERY	$1.75	Cloth	$2.75
CONCRETE FORM CONSTRUCTION	$1.65	Cloth	$2.65
FRAMING, SHEATHING AND INSULATION	$2.45	Cloth	$3.50
INTERIOR AND EXTERIOR TRIM	$2.45	Cloth	$3.50
SIMPLIFIED STAIR LAYOUT	$1.50		



A-C FUNDAMENTALS
by Clarence H. Bensman

A basic student text and laboratory manual covering principles of A-C electricity and their application. Each principle explained, then demonstrated through experiment. New, revised, complete.



INDUSTRIAL ELECTRONICS
by Harold W. Ranney

A comprehensive laboratory text on principles and operation of electronic tubes in industrial electronic control circuits. An advanced text, right up-to-the minute.

● ELECTRICAL-RADIO SERIES

DIRECT CURRENT FUNDAMENTALS	$2.25
ELECTRICAL MEASUREMENT	$1.20
ELECTRICAL CIRCUIT DIAGRAMS	$1.20
FUNDAMENTALS OF RADIO RECEIVERS	$2.75
ELECTRIC MOTOR CONTROL	$2.45
CATHODE RAY OSCILLOGRAPH IN INDUSTRIAL ELECTRONIC CIRCUITS	$3.50

METHODS OF TEACHING INDUSTRIAL SUBJECTS

— by Gerald B. Leighbody

Basic methods of teaching skills in the shop, and related technical information in the classroom, are discussed in this new book. Problem material provides actual experience in applying various teaching methods.

177 pages DeLuxe Cloth bound $3.50

● TEACHER TRAINING

TEACHING RELATED INFORMATION $1.40

Write Dept. IA 99 for Examination copies

DELMAR PUBLISHERS INC.
ALBANY 1, NEW YORK

PRACTICAL
American Tech-books

AUTOMOTIVE
Automotive Fundamentals $4.90

BUILDING TRADES
Fundamentals of Carpentry, Tools, Materials, Practice 3.25
Fundamentals of Carpentry, Practical Construction 4.25
Masonry Simplified, Tools, Materials, Practice 4.50
Masonry Simplified, Practical Construction 5.00

DRAFTING
Applied Drawing and Sketching ..... Ready soon
Simplified Architectural Drawing 5.00
Study of the Orders 4.50

ELECTRICITY
Fundamentals of Electricity 3.00
Interior Electric Wiring and Estimating 2.75

MACHINE AND ALLIED SUBJECTS
Machine Shop Work 3.75
Strength of Materials 4.90
Precision Measuring for the Metal Trades 3.00
Machine Trade Blueprint Reading 2.25

MATHEMATICS
Mathematics for Industry 5.50
Shop Geometry and Trigonometry 2.75

PRINTING
Graphic Arts Procedures 3.75

SAFETY
A Good Mechanic Seldom Gets Hurt .. .75
Safe Work Practice in Woodworking .. .60
Safe Work Practice in Sheet Metal Work ..... .75

TEACHER TRAINING
Teaching Apprentices and Preparing Training Materials 3.00
Vocational Education in a Democracy 6.50
A Primer of Life Adjustment Education ..... .45
Training High-School Youth for Employment 3.50

Dept.W 364

Please rush the books checked above, to me on 30 days examination.

Name.....
School.....
School Address.....
City.....Zone....State.....

AMERICAN TECHNICAL SOCIETY

Publishers Since 1898
DREXEL AVENUE AT 58th STREET
CHICAGO 37, ILLINOIS

Shop Equipment News
NEW PRODUCTS — PUBLICATIONS

PRECISION TURRET LATHE AND A 12-IN. PRECISION LEVEL

The South Bend Lathe Works has resumed production of their No. 2-H Precision Turret Lathe, which had been discontinued during the war. Many improvements and refinements in design have been made which contribute to the efficiency and accuracy of the postwar models. These include a turret locking mechanism which will index the turret head within plus or minus .0005 in. measured 4 in. from the turret face.

New precision 2-H turret lathe

The 2-H Turret Lathe can be equipped with universal chuck or independent chuck for machining castings, forgings, etc., or it can be equipped with hand-lever draw-in collet attachment for machining bar stock or tubing. Maximum swing over the bed is 16¼ in., over cross slide 6⅞ in. Maximum collet capacity is 1 in. round, and hole through spindle is 1⅜ in. The hexagon turret has 1½-in. diameter holes for turret tools. Clearance from center of tool hole to top of turret slide is 2½ in. The effective feed of the turret slide is 6⅛ in. Change gears in the turret apron provide an additional change for turret power feed, independent of the universal carriage feeds in both rate and direction.

Complete description and specifications of the No. 2-H Turret Lathe are contained in Catalog No. 67-F, which can be secured from the South Bend Lathe Works, 178 E. Madison St., South Bend 22, Ind.

This firm also announces a new sensitive 12-in. precision level designed especially for leveling machine tools. It has a ground and graduated vial mounted in a 12-in. cast iron frame with the base precision ground on all useful surfaces including the V way for leveling shafts. The spirit vial has been carefully selected to provide the correct sensitivity for quick, accurate leveling. It is substantially mounted in the frame and protected from accidental breakage by an aluminum alloy cylinder which may be revolved to completely enclose the vial.

Leveling up the lathe with a 12-in. precision level

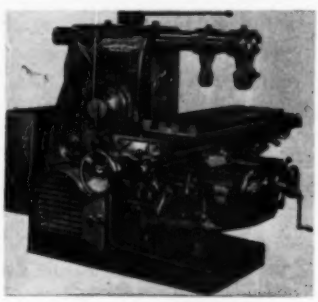
12-in precision level

Catalogs with specifications of the No. 2-H Turret Lathe and of the 12-in. level can be secured from the South Bend Lathe Works, 178 East Madison St., South Bend 22, Ind.

For brief reference use IAVE—0901.

CHUCKING-TABLE MILLING MACHINE

Kearney & Trecker Corporation, Milwaukee, Wis., have developed a new line of knee type milling machines, featuring a built-in chucking table which is intended to facilitate the handling of irregularly shaped workpieces, without resorting to costly special tooling and fixtures. The design of the table is such that with certain simplified vise jaws and standard setup accessories, a chucking mechanism is provided to handle various shaped workpieces with a minimum of time for setup.



Plain chucking-table milling machine

Chucking table accessories include the master jaw bases, consisting of two large T-nut units connected by a right and left-hand screw, the end of which is squared to take a crank handle. These master jaw bases fit both the longitudinal and transverse table T slots. The number of these bases required will be determined by the size of the workpiece and the contemplated method of clamping.

In addition to the various types of universal vise jaws, other work-holding and locating accessories are available. These include an adjustable spring loaded screw jack and a plain screw jack for mounting in the large transverse and longitudinal table T slots, and a smaller plain screw jack for use in the small longitudinal table T slot. Bumper stops for end location are also offered. A crank handle for moving the vise jaw is provided.

For brief reference use IAVE—0902.

NEW GENERAL ELECTRIC MOTOR KITS

The illustration, shown herewith, presents a view of some of the unassembled parts included in the new General Electric educational fractional-h.p. motor construction kits. These kits,

(Continued on page 39A)

Here's a new way to teach ELECTRONIC MOTOR CONTROL

G-E THY-MO-TROL* Kit Gives Schools a Simple, Practical Teaching Aid

Here is a new operating kit with specially designed control panel to help you teach the "how" and "why" of electronic control. Circuit diagram on panel simplifies explanation of operation. All parts (except tubes) are mounted directly behind symbols. Equipment includes meters for indicating armature current and voltage, and jacks at all important circuit points for convenient electrical measurement.

Easy to assemble, this equipment is supplied *complete* in kit form, including ½-hp motor and control station. For more information, write Section 687-8, Apparatus Dept., General Electric Co., Schenectady, N. Y.

DEMONSTRATES: Constant Speed with Varying Load (Adjustable Speed Control from 50 to 1750 rpm)
Phase Shifting
A-c Power Rectification
Grid Control of Thyratrons
Dynamic Braking
*THYratron MOtor ConTROL

GENERAL ELECTRIC

NEW PUBLICATIONS

(Continued from page 34A)

rections also are given for making a homemade jeweler's workbench.

Forming Press Dies and Their Uses

Cloth, 128 pp., 5⅜ by 8¼ in. Dreis & Krump Mfg. Co., 7400 Loomis Blvd., Chicago 36, Ill.

A fine book for designers of sheet-metal products. The book contains many illustrations of gooseneck, spring pad, high box forming, acute angle, hemming, aircraft, and other types of dies. The book is accompanied by a "Developed Blank Size Calculator."

Rapid Writing

By M. E. Zinman. Paper, 25 pp., 8¾ by 11¼ in., $1.50. Published by M. E. Zinman, 215 West 91st St., New York 24, N. Y.

A system of shorthand based on longhand. The text is designed for self-instruction, and it is claimed that an earnest student can learn the system in 36 hours.

The Library Key

By Zaidee Brown. Paper, 150 pp., 6¾ by 10 in., 70 cents. The H. W. Wilson Co., New York City.

This book is intended for senior high school and college students, for teachers, and for adult readers in general who wish to become familiar with reference books and library tools. Through the years the author has tried to adapt the *Key* more closely to the needs of teachers, college students, and other adults, by expanding the lists of reference books included. But since readers differ greatly in their knowledge of books and libraries, the *Key* also includes elementary material on library classification, and the arrangement and use of the card catalog and other standard tools. Basic information is set in large type, additional details in smaller type.

Aluminum Structural Design Handbook

Prepared by Paul E. Brandt. Paper, 124 pp., 5⅞ x 8¾ in., illus. Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky.

This handbook on how to design load-carrying aluminum structures will enable the engineer familiar with mechanics of materials to design structures of aluminum, or convert existing structural designs from some other material to aluminum.

The discussion is broken down into chapters on figuring tensile stresses, compressive stresses, bending stresses, and shear stresses, as well as stresses in cylinders subject to fluid pressure. A section is devoted to fabricating considerations and joining methods, including riveting, bolting, fusion welding and spot welding. Deflection and vibration problems also are discussed.

A goodly number of useful tables have been appended.

Development of the Metal Castings Industry

By Bruce L. Simpson. Cloth, 246 pp., 8 by 10¾ in. American Foundrymen's Association, 222 West Adams St., Chicago, Ill.

An extremely interesting historical survey of foundry methods from prehistoric times down to about 1900. The book is well illustrated and many will find it more interesting than the keenest mystery story.

106 Success Opportunities — An Exploration in the World of Work

Prepared by Arco Editorial Board. Cloth, 394 pp., 5½ by 9 in., illus., $2.50. Arco Publishing Co., 480 Lexington Ave., New York 17, N. Y.

As indicated by the name, over a hundred occupations are described in this book, showing what the worker must do, and how he can qualify for his job.

For this survey the occupations have been divided into seven great classes — agriculture, personal service, mechanical, commercial, scientific, esthetic, and professional.

Your Own Business

By Norman L. Edwards. Cloth, 186 pp., 5¾ by 8 in., $2.50. Bruce Humphries, Inc., 30 Winchester St., Boston, Mass.

What it takes to start a business and to succeed in it, is told by the author who started a business of his own while studying law. His business had done so well when he was graduated that it posed the troublesome problem — "What now, do I continue the business or do I start on my career as a lawyer?" He chose business but also finds use for his knowledge.

The book contains a great many helpful suggestions on how to choose the business one wants to enter, how to gain the good will of the customer, and the like.

General Electric Corporation, 306 Fourth Ave., P. O. Box 1017, Pittsburgh 30, Pa. (Publicity department at Schenectady 5, N. Y.), have published the above-mentioned publications which may be obtained for use in your classes.

Advances in Insurance Coverage — Accident Prevention and Control
Worker Morale and Productivity
Executive Personality and Job Success
Personnel Functions and the Line Organization
Appraising and Training Office Supervisors
Building Quality Into Manpower
Building Worker Interest in Production Problems
Management's Role in Industrial Mobilization — a 28-page booklet at 50 cents
Organization Controls and Executive Compensation — a 56-page booklet at $1

The above-mentioned, 32 to 40 pages, 6 by 9-in. booklets, contain the papers that were presented at the 1948 spring insurance conference held at Atlantic City, N. J. They are priced at 75 cents per title, except as indicated.

The booklets are published by The American Management Association, 330 West 42nd St., New York 18, N. Y.

Specify * WALLACE
on your new school-shop equipment

*WALLACE NO. 10 JOINTER
2 Models — 3600 rpm & 5200 rpm

Be Dollar-Wise!
SAVE MONEY WHEN YOU SPEND MONEY

It is being done right along! . . . By schools whose limited budgets must get the most return in longer service and better performance.

If you ARE interested in buying Bonus-Values — *specify* Wallace!

For example: WALLACE 8" Jointer ("illustrated") are in a class by themselves! They do faster and smoother work — and last longer!

**FASTER CUTTING ASSURES BETTER WORK*

**4 SKEW-SET KNIVES TAKE SHEARING CUT*

Write Today for free Bulletins & Prices on Your Machine Needs

*RADIAL ARM & UNIVERSAL SAWS * JOINTERS * BANDSAWS * MORTISERS * SHAPERS * LATHES * BORERS * SANDERS * GRINDERS *

J. D. WALLACE & COMPANY
140 So. California Ave. • • • Chicago 12, Ill.

PIONEER MANUFACTURERS OF PORTABLE WOODWORKING MACHINES

*WALLACE on the Nameplate of YOUR Machine is a positive Guarantee of the Highest Quality and Durability.

New Columbian 804 Steel Welded Workshop Vise
With Handy Removable Pipe Jaws

The Columbian 804 Work Shop Vise is a rugged all-purpose vise of steel construction — fabricated by arc welding. Front and back jaws are welded from heavy steel. Screw and handle are cold rolled steel. Each Columbian 804 is finished in red enamel and packed in individual cartons.

Columbian Workshop Vise

★ Columbian Continuous Screw Woodworker's Vises are furnished with hard wood handles — or may be equipped with ADJUSTABLE STEEL HANDLES as above, to eliminate handle breakage, speed operation and provide extra leverage.

THE COLUMBIAN VISE & MFG. CO.
9022 Bessemer Avenue • Cleveland 4, Ohio
THE WORLD'S LARGEST MAKERS OF VISES

new sander
PORTABLE ELECTRIC

STERLING **century** SANDER

Now! Low cost, fast, *safe*, easy sanding with the new Sterling Century. Sand wood, metal, slate, composition—desks, blackboards, lockers—all types of school maintenance work. Send for folder!

Vocational Instructors!
Acquaint your students with production and maintenance sanding. It's faster, easier, better!

STP

STERLING TOOL PRODUCTS CO.
1336-P Milwaukee Avenue, Chicago 22, Illinois
Canada: Terminal Warehouse, Dept. 35, Toronto 1.
Send folder on New Sterling Century Sander

FIRM NAME _____
ATTENTION _____
STREET _____ CITY _____ STATE _____

Shop Benches
BY SJÖSTRÖM

Sturdy Sjöström Work Benches—

- Ideal for school shops where long life and maximum utility are a "must".
- Attractive heavy duty construction—natural finish maple and birch, with stout 2¼" edge grain tops; tops and bases bolt reinforced.
- Four types—single (52" x 22" x 32") and two student (52" x 36" x 32") types; with or without tool drawers of durable dovetailed construction.
- Equipment for each student—continuous screw vise with ample 4" x 7" jaws, metal bench hook and dog.

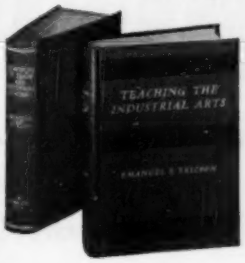
Write Today for Prices and Specifications.

JOHN E. SJÖSTRÖM COMPANY
1715 N. Tenth Street, Philadelphia 22, Penna.

• **Benefit by other's experience. Years of study and research combined with the latest knowledge in the field have helped the authors produce these outstanding and popular texts.**

COURSE MAKING in INDUSTRIAL EDUCATION Friese

A. A textbook that deals with course planning in vocational and industrial arts education, including five sample formats. Easy to use, direct, clear and logical in every development. $3.50



B. MECHANICAL DRAWING PROBLEMS *Berg and Kronquist*
A complete 2-year high school course, based on teaching by example. Problems are selected from industry and the trades. Conforms with American standards. Cloth, $1.96; paper, $1.56.

C. INDUSTRIAL ARTS DESIGN *Varnum*
Comprehensive, practical discussion of principles of design as applied to wood, clay, metal, etc. New, logical form greatly simplifies the teaching of design. $4.50

D. DESIGN IN THE INDUSTRIAL ARTS *Bradley*
Covers problems of art and design in handicrafts, selection of manufactured articles, and approach to representative jobs of designing for production. $3.00

E. INDUSTRIAL-ARTS ELECTRICITY *Lusk and Eagle*
Planned to provide the right amount of information, presented in the right way for the junior high, and beginning high school student. $2.20

F. SHEET-METAL PATTERN DRAFTING *Daugherty*
114 typical problems, easy to apply to trade conditions. All illustrated with full page detail drawing of the development, step-by-step instructions, photograph of the finished form. Cloth, $3.50; paper, $2.24.

G. THE PRACTICE OF PRINTING *Polk*
The leading book in the field of school printing. Covers the whole practice of printing from job layout to gathering, folding, and covering the finished product. $2.25

H. ELEMENTARY PRINTING JOB SHEETS *Polk* $1.04

I. ELEMENTARY PLATEN PRESSWORK *Polk* 2.00

J. GENERAL SHOP HANDBOOK *Willoughby and Chamberlain* .92

K. PROBLEMS IN BLUEPRINT READING *Castle* .96

L. PROBLEMS IN ARCHITECTURAL DRAWING *Elwood* 3.00

M. BASIC ELECTRICITY *Feirer and Williams* 2.48

N. BASIC BENCH-METAL PRACTICE *Giachino and Feirer* 2.96

O. MODERN METALCRAFT *Feirer* 3.50

P. WOODWORK FOR SECONDARY SCHOOLS *Griffith and Cox* 2.95

Q. WOODWORKING WORKBOOK *Nichols and Stiles* .56

R. CARPENTRY *Griffith and Cox* 2.00

TEACHING the INDUSTRIAL ARTS Ericson

S. How to improve one's own teaching through proved methods of organizing equipment and courses of instruction. Hundreds of teaching details discussed fully from the teachers' point of view. No other book can give more real professional service than this text, regardless of one's teaching experience. $4.00

T. PRINCIPLES OF TRADE AND INDUSTRIAL TEACHING *Selvidge and Fryklund*
The soundest plan of definite teaching procedure that's offered — objectives, methods, and the psychology of teaching and learning. For all teachers and all teacher-training classes. $3.50

U. ORGANIZING AND TEACHING THE GENERAL SHOP *Newkirk*
Full of ideas on selecting problems, projects, and teaching under general shop conditions with numerous, complete examples of problems analyzed for age level, materials and equipment needed as well as other important background questions. The most practical and most workable plans for organizing and teaching general shop work. $3.50

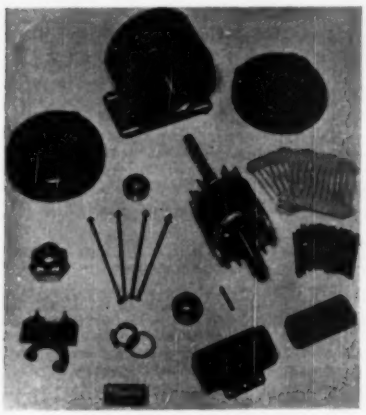
CLIP THE COUPON BELOW AND MAIL TODAY

THE MANUAL ARTS PRESS
809 Duroc Bldg., Peoria 3, Ill. .....19...
Please send the books circled with view to adoption. I will either remit for them or return them within 30 days.
A B C D E F G H I J K L M N O P Q R S T U
Name .....
Address .....
City..... Zone.... State.....
School and Position .....

SHOP EQUIPMENT NEWS

(Continued from page 36A)

which contain all the components necessary to build a regulation motor, were designed as an aid in teaching school children the principles of the electric motor.



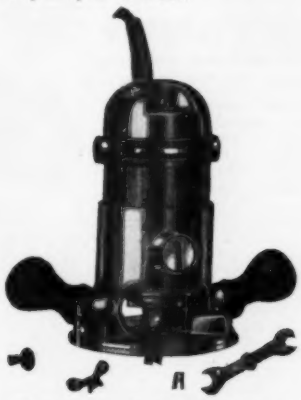
General Electric motor kits

For further information write to the Apparatus News Bureau, General Electric Co., Schenectady 5, N. Y.

For brief reference use IAVE—0903.

NEW STANLEY ½-H.P. MOTOR AND A ¼-IN. ELECTRIC DRILL

Stanley Electric Tools, New Britain, Conn., announces the development of the new style Stanley-Carter No. 8 — ½-h.p. motor, to be used with the various attachments and accessories that they carry in their line.



Stanley-Carter No. 8 motor

The new No. 8 motor has the following features: ventilating system provides powerful air blast to cool motor and keep work surfaces clean; specially designed, sealed for life, oversize ball bearings — no oiling required; new heavy duty motor wound and insulated to withstand severe mechanical shock and vibration; it is equipped with an accurately ground collet-type chuck which will not slip.

This new style motor is designed to fit a large line of Stanley-Carter tools. It can be used with the RS8 router-shaper to do routing and shaping cuts, and with the R8 for routing only. These new routers are also furnished with an aluminum anodized subbase, which prevents wear and protects the work surfaces from marring and discoloration. The motor is also adaptable to the J3 power plane, the tool post grinder, the bench stand grinder, the WS8 weather-strip groover, and the dovetail attachments and other accessories furnished with the old style routers.

This firm also announces a new No. 24A ¼-in.

Stanley No. 24A electric drill

electric drill. This sturdy drill possesses surplus power for drilling in metal, wood, and composition materials. It can be used at full load for continuous drilling without stalling. Speed, 1800 r.p.m. no load; 1100 r.p.m. full load.

It has a strong aluminum alloy die cast housing, helical gears, oil impregnated bronze bearings, three-jaw Jacobs chuck, trigger-type switch with locking device, and rubber covered cord — three wire with ground connection.

For brief reference use IAVE—0904.

WILLIAMS NEW ADJUSTABLE CROWFOOT ATTACHMENTS
Patent Applied For

Williams new adjustable crowfoot attachments, when used with the numerous handles and parts available, present an endless variety of combinations which previous wrenches did not possess. Machinists and mechanics everywhere are finding

(Continued on next page)

PAXTON LUMBER

. . . for consistently higher quality for all the woodworking projects constructed in your school shop

Supply your woodworking students with Paxton lumber and plywood and assure them first quality materials. Their projects will acquire added beauty and durability when made of Paxton products. As a result, the student will derive greater satisfaction from his efforts to create an attractive article out of wood.

Paxton lumber and plywood meet every requirement and have always represented first quality — an important consideration in modern school shops where materials of doubtful quality have never proven an economy.

We are prepared to supply you at all times with lumber and plywood of the highest quality obtainable, measured and graded in the best interpretation of current national grading rules. Our reputation guarantees you the finest in these materials.

FRANK PAXTON LUMBER COMPANY

FRANK PAXTON LUMBER CO.

Specialists in Industrial Arts Lumber and Plywood

WRITE TO YARD NEAREST YOU FOR FREE CATALOG

Offices and Yards at:

Chicago, Illinois — 5701 W. 66th Street
Denver, Colorado — P.O. Box 1676
Des Moines, Iowa — P.O. Box 683
Fort Worth, Texas — P.O. Box 1225
Kansas City, Kansas — Packers Station

SHOP EQUIPMENT NEWS

(Continued from previous page)

new ways to approach difficult service problems with the use of these ingenious attachments which allow the performance of nut turning jobs that were never thought possible.

Williams adjustable crowfoot attachments are made from selected alloy steel in two square drive sizes, ⅜ and ½ in., with capacities of ¾- and 15/16-in. respectively. Square shoulders on the body portion of the sliding jaw provide maximum and positive bearing against working stress.

Williams Booklet No. A-50 lists both sizes of these attachments plus a complete line of handles and parts. Ask your dealer for a copy of this booklet or write to J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y.

For brief reference use IAVE—0905.

Williams adjustable crowfoot attachment

NEW PROTO SOCKET WRENCHES

An addition of 12 more Proto socket wrenches has been announced by the Plomb Tool Co., Los Angeles 54, Calif.

One, designated 4712S, is a ¼-in. drive, 8-point (double square) socket with ⅜-in. opening, used for No. 10 machine screw and 5/16-in. stove bolt nuts on many small assemblies. Nos. 5208S, 5210S, 5212S, 5214S, and 5216S are ¼-in. drive, 8-point sockets with openings of ¼, 5/16, ⅜, 7/16, and ½ in., for use on squares such as plugs, set-screw heads, adjusting screws, stove and machine bolt nuts, and lag screws. Nos. 5226 and 5228

New Proto sockets

are ¾-in. drive, 12-point (double hexagon) sockets with 13/16- and ⅞-in. openings. No. 5272 is a universal-type ¾-in. drive, 12-point socket with 13/16 opening. No. 5412 is a ½-in. drive, 12-point socket with ¾-in. opening. The other two additions are ¾-in. drive screw driver sockets. No. 5240, with a 5/16 by .040-in. bit, is extra long to permit use on small assemblies where clearance is limited. No. 5244, with an 1 1/16 by .116-in. bit, is a heavy-duty type for use on large slotted screws and nuts. When these two sockets were added, six existing screw-driver sockets were redesigned. Four were lengthened to provide more clearance, and the bits of four were changed to more usable sizes.

PROTO TOOLS LOS ANGELES

The name "Proto" is featured in the newly designed trademark, shown herewith. The expression, "A different name for your old friends," is being used to publicize the Proto trademark, originally adopted early in 1948.

For brief reference use IAVE—0906.

NEW PORTABLE 6-IN. GUILD, AND 8-IN. SPEEDMATIC SAWS

The Porter-Cable Machine Co., Syracuse 8, N. Y., announces the addition of a new all-purpose, 6-in. saw to its line of Guild tools. This high-powered, lightweight Guild A-6 saw is recommended for general carpentry, building and contracting, maintenance, crating, floor installation and repair, cabinetwork and countless home uses. Like all Porter-Cable saws, the A-6 features perfect balance.

It has a 6¼-in. diameter blade with a ⅝-in. standard round hole. Its depth adjustment can be accurately regulated for any depth from ½ to 2 in. Designed for one-hand operation, the saw has a trigger switch located on the handle for accurate control and ease of operation.

(Continued on page 42A)

FASCINATING and EDUCATIONAL

Make Unique Type Lamps

From Parts We Supply FOR ANTIQUES or HOBBIES • Save Money •

We offer you the most complete line of lamp parts in the country. Lamp parts of all kinds. Harps, Sockets, Cords, Plugs, All Types of Fittings, Bases, China; to make most popular table and floor lamps. Instructors and teachers: have your students make lamps that can be sold at large profits. We furnish parts that are necessary at wholesale prices. Send for Catalog NOW so you can plan your semester, using lamps as one of your projects.

Write Today

For FREE Catalog: Shows You How.

THE GEARON COMPANY 27 So. Desplaines St., Chicago 6, Ill. Dept. 100-K9

A fascinating new craft

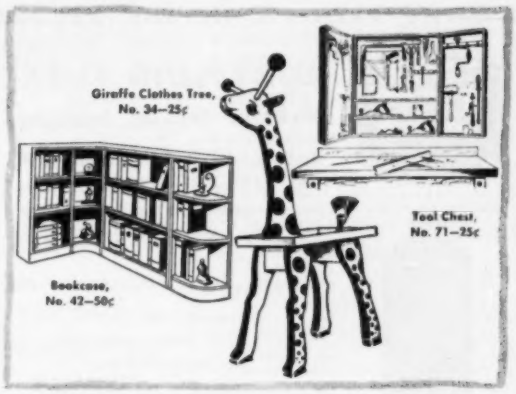
CASTING WITH PLASTICS

No special equipment or machinery necessary

- As easy as pouring water out of a glass.
- Hardens quickly. A wide variety of castable materials — clear plastic or opaques that are similar to ivory, ebony, marble, porcelain, stone. Mold-making simplified with our new rubber and latex compositions.
- SCHOOLS throughout the country are adapting PLASTICAST products to their Manual Training and Vocational courses.
- WRITE for large free catalog which explains methods fully.

HOBBYCAST PLASTICS, INC.

4637 N. Kedzie Dept. C-9 Chicago 25, Ill.



EASI-BILD* Full-Size Patterns speed manual training 2 ways:

1. **Easi-Bild** makes project selection easier. Folder illustrates over 100 *useful, practical* projects.
2. **Gives student** self confidence because he makes something *quick* and *right* the first time. No blueprint training required.

Plus: the experience in using these famous CASCO industry-tested glues recommended by Easi-Bild.

Cascophen for outdoor projects—boats, sports equipment.

Cascamite for indoor projects—furniture, toys, cabinets.

Cascorez for models, paper projects or where "fast set" is important.

See for yourself. Send coupon below for any of the 3 popular patterns shown above . . . also description of complete pattern service. See how Easi-Bild *simplifies* woodworking.

CASCO Pattern Dept. IV-99, P. O. Box 215, Pleasantville, N. Y.
Enclosed is ..... for patterns checked below.
☐ Bookcase, No. 42—50¢ . . . ☐ Tool Chest, No. 71—25¢
. . . ☐ Giraffe Clothes Tree, No. 34—25¢

Name ..... Title .....
School .....
Address .....
City ..... Zone ..... State .....

THE BORDEN COMPANY • CHEMICAL DIVISION
Makers of Casco Glues

*© 1949, Easi-Bild Pattern Co.

THE PROOF'S IN THE USE

RUBYFLUID FLUX

IS Better for All Soldering

Ruby's BIG $1 Sample —
1 pt. of liquid and ½ lb. of paste flux is more than enough to show you why we say Rubyfluid is a better flux.

- **Rubyfluid —**
  - Wets out freely . . .
  - Makes stronger neater joints . . .
  - Has no harmful fumes . . .
  - Acts quickly and saves time . . .

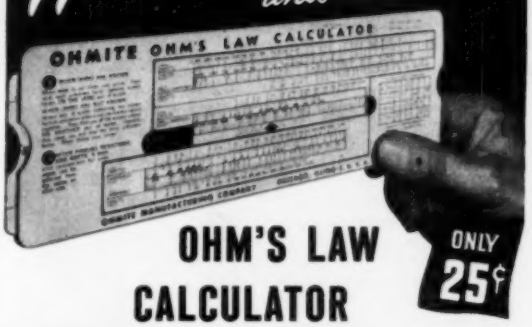
Ruby also will send you free its new booklet of simplified instructions on "How To Solder."

Write for the $1 Sample and Booklet Today

THE RUBY CHEMICAL CO.
77 McDowell St. Columbus 8, Ohio

Rubyfluid

Handy Aid for Teachers and Students



OHM'S LAW CALCULATOR

ONLY 25¢

Available in Quantities to Teachers at a Special Price. Write for Further Information.

SOLVES ANY OHM'S LAW PROBLEM WITH ONE SETTING OF THE SLIDE

Here's a new and improved version of the famous Ohmite Ohm's Law Calculator. Used the world over by teachers, students, engineers. Figures ohms, watts, volts, amperes—quickly, accurately. All values are direct reading. New handy pocket size—9" x 3". Send 25c in coin for your calculator.

OHMITE MANUFACTURING CO., 4991 Flournoy Street, Chicago 44, Ill.

Be Right with **OHMITE**

RHEOSTATS • RESISTORS • TAP SWITCHES

SHOP EQUIPMENT NEWS

(Continued from page 40A)

Guild A-6 saw

A powerful turbine fan draws air through the motor and discharges it at the front, blowing the dust off the line of work. The saw blade housing has a separate rear discharge outlet so that no dust from the blade can work back into the motor.

The saw is equipped with hardened steel helical gears as are the heavier Speedmatic saws. Operator safety is assured by the carefully guarded blade.

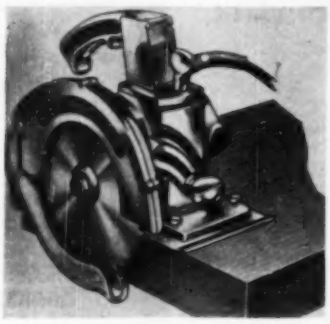
It has a 115-volt a.c./d.c. motor; speed, idle, 5500 r.p.m.; speed, load, 3200 r.p.m; size over-all, 10 in. long, 8⅛ in. wide, 9⅛ in. high.

This firm also has perfected a new improved 8-in. type K-89 Speedmatic saw which features a very powerful motor that permits fast cross-cutting and ripping.

The saw is a medium weight, high powered, one-handed saw for general work. A new Protecto-Wall between saw and motor seals out dust and grit. The position of the handle, at the top at the center of gravity, enables the operator to guide the saw with minimum effort and fatigue. Helical gear drive delivers the highest percentage of motor power to the cutting blade.

A strong fan draws air through the motor and discharges it at the front, keeping the line of work ahead clear of sawdust and fully visible at all times. A large opening in the rear of the saw blade housing discharges the sawdust.

The 8-in. saw blade with a ⅝-in. standard round hole is located at the right of saw center, which is the operationally correct position. Abrasive cutting wheels are also available for work with tile, metal, etc. The saw is adjustable for any depth up to 2¾ in., and is graduated for any angle up to 45 deg.



New K-89 speedmatic saw

Standard equipment includes a Hammerstone-finish steel carrying case, 10-ft. cord and plug, wrenches, and rip gauge.

It has a 115-volt a.c./d.c. motor; speed, idle, 7000 r.p.m; saw speed, load, 4500 r.p.m.; size over-all, 12 in. long, 8⅜ in. wide, 11½ in. high; net weight, 17 lb.

For further information on either of these saws write to The Porter-Cable Machine Co., Syracuse 8, N. Y.

For brief reference use IAVE—0907.

THE SNAP-ON WRENCH SELECTOR

Snap-on Tools Corporation, Kenosha, Wis., has available a "Wrench Selector" which makes the selection of the proper size wrench for bolts from size 0 to 4 in. thread diameter a simple matter. Just slide the center section of the Selector in the manner of a slide rule until the size or diameter of the bolt you have in mind is positioned in the cutout section marked *Bolt Diam.* Immediately below this will be indicated the proper wrench size for American Standard, U.S.S. (NC), and S.A.E. (NF) bolts and nuts; American Standard cap screws, machine screws,

(Continued on page 44A)

SPECIAL INTRODUCTORY KIT

Paint craft objects with rayon!

REVOLUTIONARY kit opens new beauties to craft and shop work. Decorate, cover repairs, apply scratchless bases. Complete introductory kit includes undercoat in 2 colors, finest rayon "SUEDE-TEX" flock in 2 colors, patented high-velocity spray gun, brush, thinner, enough for 30 square feet.

18 beautiful colors available in small quantities or bulk.

WRITE FOR FREE LITERATURE AND SAMPLE.

40% discount to accredited teachers and schools — Complete introductory kit, lists..... **$7.95**

DonJer Products Co., 1115 Sterling Place, Brooklyn 13V, N. Y.

CHECK THIS LIST →

We've Got the

Plastics

and Accessories You Need for PLASTIC CRAFT PROJECTS In Stock for Immediate Shipment ! !

- PLEXIGLAS
- LUCITE
- CELLULOSE ACETATE
- CASTOLITE
- ADHESIVES
- METAL FINDINGS
- PLASTIC JEWELS
- DYES
- BUFFS
- FINISHING COMPOUNDS
- POWER TOOLS

- METALLIC COATED CELLULOSE ACETATE
- SCREW DRIVER HANDLE STOCK
- HANDBOOKS

Over 2000 Items in Stock for Immediate Shipment

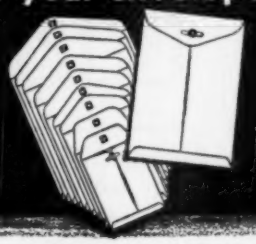
All sizes and colors of nationally known brands of sheets, rods, tubes, and liquids—Plexiglas, Lucite, Cellulose Acetate, Castolite, and others—over 2000 items in all—are available for immediate shipment from our giant, completely stocked warehouse. In addition, we carry one of the largest selections of adhesives, dyes, finishing compounds, and other essentials on the market. All orders are handled promptly, and our mid-continental location enables us to conveniently ship to any part of the country.

INSTRUCTORS: Take the first step NOW to get the plastics you need by sending for our free 14-page price list, folder on Internal Carving, Jewelry Findings Catalog, and Information on Fabrication of Plastics. Write on school letterhead stating position. STUDENTS must send 25¢ for this literature which amount will be deducted from first order.

STYROFOAM
for Carving Models, Novelties, Gifts
Can be worked with hand or power tools. Eliminates most needs for conventional methods of fastening, such as, wire, glue, screws, etc.

PLASTIC PARTS & SALES Dept. S-2099
1157 S. Kingshighway, St. Louis 10, Mo.

Know your envelopes . . .



Clasp Envelopes

"A convenient means to inexpensive packaging."

When you want extra safety and additional protection for your large or bulky materials to be mailed, then you should use a Clasp Envelope. These envelopes are built of rugged, heavy stock, equipped with a burrless metal clasp, and come in a wide variety of sizes. They are used in many cases to carry heavy magazines, machine parts, steel wool, shavings, instruction manuals, photographs, cloth or fabric samples, and similar large items that require complete protection but do not call for the expense of a box container. The clasp feature permits you to insert and extract the contents several times. The clasp also allows you to send material through the mail at third class rates yet guarantees you of a protective seal.

Western stocks 22 sizes ranging from 2½"x 4¼" to 12"x 15½".

WESTERN STATES *Envelope Company*

1616 WEST PIERCE ST. MILWAUKEE 4, WISCONSIN

BUY DIRECT

FROM THE

MANUFACTURER

•

T. A. FOLEY LUMBER CO.

Dept. L

PARIS • ILLINOIS

•

SEND FOR NEW **FREE** CATALOG NOW

STERLING STEEL FLASKS

Assure Easy Handling

Sterling all-steel, all-welded foundry flasks combine maximum strength with minimum weight. Solid center rib and solid sand flanges at top and bottom. Full-width bearing. In style "S" flask, pin lugs and handles are combined. When closing flask, molder can guide cope over pins by feeling pins with his fingers. In many foundries, style "S" flask has replaced snap flasks. Prevents run-outs. Requires less sand.

Write for new Catalog No. 59, describing the complete line of Sterling Foundry Equipment.

Sterling FOUNDRY FLASKS

STERLING WHEELBARROW COMPANY — MILWAUKEE 14, WIS., U. S. A.

SEALACELL PROCESS

PENETRATING WOOD FINISHES

Sealacell
Varnowax
Royal Finish

for

Furniture — Cabinets
Millwork

NO BRUSHES REQUIRED

NO RUBBING BETWEEN COATS

Send For Folder "Facts."
A Post Card Will Bring It.

GENERAL FINISHES SALES AND SERVICE CO.

1348 West Bruce Street Milwaukee 4, Wis.

SHOP EQUIPMENT NEWS

(Continued from page 42A)

and stove bolt nuts as well as the number of threads per inch.

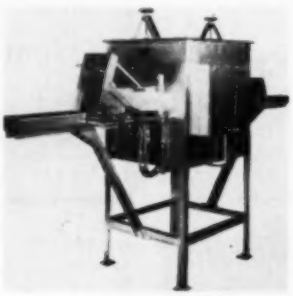
To increase the usefulness of the "Selector," a decimal equivalent chart has been added with fractions figured to six decimal places.

The Selector measures only 6 by 2½ in. which makes it handy to carry around. Vocational shop instructors may get one of these selectors by writing to the Advertising Department, Snap-on Tools Corporation, Kenosha, Wis.

For brief reference use IAVE—0908.

NEW ELECTRIC FURNACE FOR SINTERING AND BRAZING, BRIGHT ANNEALING

The Pereny Equipment Company, 893 Chambers Road, Columbus 12, Ohio, just announced a new electric furnace, known as their Model "SNX," designed specifically for use in sintering powdered metals, brazing, bright annealing, and for many metallurgical research problems involved in practically every industry, including ceramics. Normal heat range is 1400° to 2500° F. — "flash" firing to 2750° F. Unit is Globar element furnace of the manual pusher type, designed for batch treatment on a "straight-line," three-zone system.



Model SNX Pereco furnace

The work moves from the purge, or preheat chamber, through the high temperature area, and then through the water-cooled, cooling zone. Both doors are counterbalanced and are equipped with automatically operated flame curtains which prevent contamination of the furnace atmosphere when the doors are open. Gas tight construction is used throughout, with connections provided for introduction of controlled atmospheres. Most types of atmospheres may be used in this furnace except those few types which attack the Globar (silicon carbide) elements.

The unit has a high temperature zone area of 4 by 4 by 12 in. Maximum power input is 15 kw.

For brief reference use IAVE—0909.

WANT GOOD SERVICE?

When in a rush, send your order to us 27 years of good materials.

OUR NEW CATALOGUE NOW READY

INDIANHEAD ARCHERY MFG. CO
BOX 303-BP LIMA, OHIO

Extra prompt service

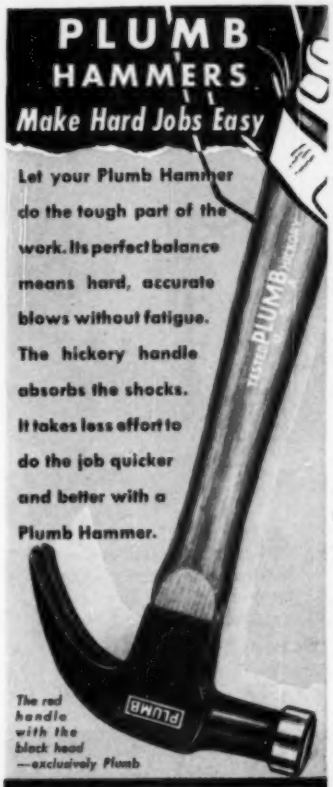
500 SOURCES OF BUILDING INFORMATION
235 Actually FREE

Now you can lick any building job—any building problem! 57 page service, packed with hundreds of sources of expert advice by nation's leading authorities. Worth thousands of dollars. Save time, money, when you buy, build, design, repair, alter, instruct. Only $2.00 for complete directory—and, you may order on FREE TRIAL. SEND NO MONEY. Just name, address. We bill you $2.00 plus postage. Or send payment, we pay postage. (money back guarantee). Act now! Write WESTPORT PUBLISHING COMPANY, Dept. 1177, Westport, Conn.

PLUMB HAMMERS

Make Hard Jobs Easy

Let your Plumb Hammer do the tough part of the work. Its perfect balance means hard, accurate blows without fatigue. The hickory handle absorbs the shocks. It takes less effort to do the job quicker and better with a Plumb Hammer.



The red handle with the black head —exclusively Plumb

HAMMERS HATCHETS AXES FILES

PLUMB

PROMPT SHIPMENTS from a COMPLETE STOCK of LARSON LEATHER

For everything in leather when you need it — consult Larson Leathercraft Headquarters. Wide line to chose from. Moderate priced tooling leathers as well as top quality calfskins.

We supply all tools, materials and instructions for making:

- *GLOVES*
- *WOOLSKIN TOYS and MITTENS*
- *LINK BELTS*
- *PYROSTRIPS*
- *COIN PURSES*
- *MOCCASINS*
- *COMB CASES*
- *BILLFOLDS*
- *KEY CASES*

MANY OTHER USEFUL ITEMS

Send for FREE catalog

J. C. LARSON COMPANY

Dept. K — 820 S. Tripp Avenue Chicago 24, Ill.

HOME MECHANICS

By J. C. Woodin

Revised 1949. Practical, down-to-earth course in household mechanics. 29 units applicable to elementary, junior high, senior high and even adults. 167 illustrations. Contents: Repair of window and door screens, locks, electrical cords, motors, electric iron, vacuum cleaner, stoves, care and upkeep of plumbing, lighting, furniture, reading meters, hot water system and many other valuable topics. 104 pages. $1.25. Send for approval copy. Clip this.

MACHINING OF METAL By Robert E. Smith

Revised 1949. Clear, easy-to-understand instructions on the operation and care of the drill press, engine lathe, shaper, milling machine, tool grinder, universal grinder and power hack saw. Many illustrations show proper use of tools, position of operator and safety precautions. Several excellent projects. Cloth cover. 224 pages. $3.50. *Send for approval copy. Clip this.*

and

McKNIGHT & McKNIGHT PUBLISHING COMPANY

Dept. 16, Market and Center Sts., Bloomington, Ill.

There is no substitute for Quality

• For best classroom results, make sure the Drafting Supplies and Artist Materials you use bear the well-known WEBER Trade-mark . . . . .

WEBER

Trade Mark Reg. U. S. Pat. Off.

Artist and Drawing Materials

CAT. VOL. 700 TO TEACHERS AND SCHOOLS ON REQUEST

MECHANICAL DRAWING SUPPLIES		ART AND COMMERCIAL ART MATERIALS	
Drawing Instruments	Curves	Tempera	Brushes
T-Squares	Scales	Show Card Colors	Linol Block Printing Inks and Materials
Triangles	Slide Rules	Malfa Oil and Water Colors	School and Drafting Room Furniture
Drawing Boards	Protractors	Waterproof Drawing Inks	
Drawing Tables			

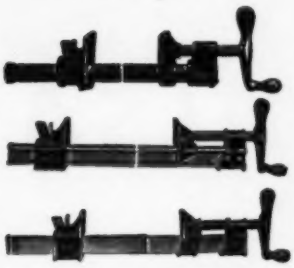
Patronize Your Nearest Weber Dealer

F. WEBER CO.

PHILADELPHIA 23, PA.

St. Louis 1, Mo. Baltimore 1, Md.

TRADE MARK "Jorgensen" REG U S PAT OFF



CLAMPS

Our "PONY" Clamp Fixtures (to make clamps on a piece of pipe) have revolutionized the bar-clamp field by their numerous advantages. As usual, there are attempts made to produce something else "just as good" and with the usual results.

You can get the heavier and more powerful clamps in either the flat-bar or "I"-bar types, with the same principles of speed, security and economy built into them as have made the "PONY" Clamps famous. These are the genuine "JORGENSEN" Steel Bar Clamps. They cost no more than others. Write for free Catalog No. 17. Specify "JORGENSEN" or "PONY" on your orders, and see that you get the genuine to avoid disappointment.

Your dealer can supply them.

ADJUSTABLE CLAMP CO.

"The Clamp Folks"

424 N. Ashland Ave. Chicago 22, Ill.

low cost

LEWIS PROJECTS

Ready-to-Machine Castings for the Shop Student

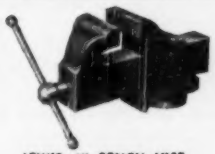
Every boy likes tools — especially if he builds his own for his own shop. Start your students today with simple Lewis Projects, costing only a few dollars. These castings finish up with a minimum of skill and time, yet prove ideal for construction purposes, student experience and practical use.

FREE CATALOG UPON REQUEST.

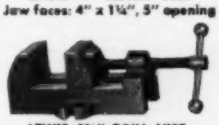
LEWIS MACHINE TOOL CO.

P.O. Box 7446, Sta. L, Dept. X

LOS ANGELES 23, CALIF.



LEWIS 4" BENCH VISE
Jaw faces: 4" x 1¼", 5" opening



LEWIS 2¾" DRILL VISE
Jaw faces: 2¾" x 1¼",
3¾" opening

METAL CRAFTS

Tools, Materials and Supplies

Send 50c for our new catalog IA. Payment credited on first $3.00 order.

METAL CRAFTS SUPPLY COMPANY

10 Thomas Street Providence, Rhode Island

TOOL UP WITH WOODWORKERS:

Champion Two-in-One Glue Joint Cutters. These make perfect glue joints on hard and soft wood. Single cutter is used cutting male and female joints by merely reversing the stock, used on shapers. Also Jet Cutter heads for glue joints, used on saw tables.

Write for circular of these and mitre lock glue joint cutters.

Woodworker's Tool Works

Incorporated

222-224 S. Jefferson St. Chicago 6, Ill.

Enjoy Easy, Profitable
LEATHERCRAFT
Make belts, handbags, novelties! Get best tools, projects, books! Leather of All Kinds for 77 Years.
Big "Fred Toebe" **Catalog** Send 10c for mailing
Chas. F. TOEBE Leather Co.
40 N. 3rd St., Phila. 6, Pa.

Plastics and Supplies
Schools in every state of the Nation use us as their principal source of supply.
We are a leader in the Plastics field.
Write for *free* list of plastics, materials, and supplies. Our prices are lower.
PLASTIC SUPPLY COMPANY
2901 N. Grand Blvd. St. Louis 7, Mo.

PLAYS for Program Directors
HEUER'S 1950 Catalog (144 pages) of plays and entertainment book . . Christmas . . Patriotic . . Stunt and Minstrel Books with a complete line of Wigs, Beards and Make-up Goods. Sent Free to Program Directors.
•
THE HEUER PUBLISHING COMPANY
Box 551 Cedar Rapids, Iowa

Heat Treating Furnaces and Equipment
FORGES—gas fired, no smoke or dirt. Sizes from the bench type at right to large floor models.
MELTERS—for aluminum, brass, lead, gold, etc., many sizes and types.
We also supply Ovens, Salt Baths, Complete Shop Tables — Blowpipes, Burners Etc.

American Gas Furnace Co.
Elizabeth, N. J.

LOOMS, Table and Foot
Reed, Raphia, Handicraft Supplies
Send for catalog
J. L. HAMMETT CO.
CAMBRIDGE, MASS.

Electro-Typers
Especially qualified to be of service to the school printshop.
Promptness and quality assured.
Forms returned same day received.
Badger - American Electrotype Co.
600 Montgomery Bldg.
407 East Michigan St., Milwaukee, Wis.

Paint Brush Conditioner
FOR SCHOOL SHOPS

● Keep your paint brushes soft and pliable. They will always be ready for use. Hard-as-rock brushes softened and reclaimed perfectly. Brushes hang in vapor and not in liquid. It is the vapor action that keeps the brushes soft. Holds 4 to 6 brushes. Satisfaction guaranteed.
Container and years supply for average need of vapor solvent **$2.75**
SEND ORDER NOW TO
WISCONSIN LABORATORIES, Inc.
2138 N. Third St. Milwaukee 12, Wis.

ELECTRIC KILNS
LONG LIFE • RIBBON TYPE HEATING ELEMENTS • ANY SIZE
2000 F° to 2200 F° — Quick Delivery
JAMES W. WELDON
Laboratory
2315 Harrison St. Kansas City 8, Mo.

Bookbinding Equipment and Supplies
Rubber Stamp Equipment and Supplies
Catalog on request
G. A. PRATT COMPANY
1108 West Chicago Ave. • East Chicago, Indiana

LEATHER & CRAFT SUPPLIES
NEW . . . Illustrated 84 page catalog . . Thousands of items for the Leathercraft teacher and student . . Leather supplies . . Tools . . Books . . Patterns . . Designs . . Art projects • Send 10¢ today to cover handling charges.
RUSSO HANDICRAFT SUPPLIES
Dept. 1A-9, 245 South Spring St., Los Angeles 14, Calif.

INSTRUCTORS
SEND FOR NEW No. 19 CATALOG OF
RED DEVIL TOOLS
64 pages in color
RED DEVIL TOOLS
Irvington, N. J.
Manufacturer of the world's famous Red Devil glass cutters and other quality tools and machines.

TECHNICAL ART BOOKS
By J. M. Bergling
Illustrated Text and Reference Books for the instruction of Industrial Arts and Crafts. Standard classic, practical modern, and artistic designs in Lettering, Monograms, Ornamental, Heraldic and Period designs are interestingly displayed and indexed. A choice and comprehensive collection for libraries, workshops and schools.
V. C. BERGLING, Publisher
P. O. Box 523-SI Coral Gables, Fla.

YELLS for School CHEERLEADERS
321 YELLS that can be adapted to any group . . . especially prepared for schools. All the yells and help you need compiled in this one book.
(124 pages) Price $1.00
order from
THE HEUER PUBLISHING COMPANY
Box 551 Cedar Rapids, Iowa

AMACO
OVER 25 YEARS OF SERVICE TO SCHOOLS AND HOBBYISTS
POTTERY SUPPLIES AND EQUIPMENT
KILNS • CLAYS • GLAZES • WHEELS
Write for Pottery Catalog
AMERICAN ART CLAY CO., Indianapolis, Ind.

★ LEATHER BELTS, HANDBAGS, ETC. for gifts, profits, prizes
IT'S EASY
IT'S FASCINATING
Portfolio of 10 *New* Handbag Patterns, full size, easy to follow instructions for transferring tooling, etc. No. 332 only $1.30.
47 *New* Western and Novelty Belt Designs. Set No. 397 only 75 cents. *65 page idea catalog sent with first order. Write today.*
Leathercraft Headquarters for 31 Years
OSBORN BROS.
223 W. Jackson Blvd. Chicago 6, Illinois

BALSA
MILL END BLOCKS
Priced below actual factory cost
★
WRITE FOR PRICES AND FULL DETAILS
TESTOR CHEMICAL COMPANY
(WOODWORKING DIV.) ROCKFORD, ILLINOIS

High Grade
Printing Inks
For SCHOOL PRINT SHOPS
COVERWELL INKS FOR QUALITY PRINTING
MARTIN DRISCOLL & CO.
610 Federal St. Chicago, Ill. Portland, Oregon 407 E. Michigan St. Milwaukee, Wis.

500 PROJECTS

232
WOOD SAWING
WINDMILL

● Above is one of 500 projects in large illustrated Craft Patterns catalog of easy-to-follow full-size patterns by A. Neely Hall, dean of the craft field. If the weekly Craft Patterns feature isn't published in your newspaper, send 25 cents to us direct for new catalog and coupon good for 50 cents on $1.50 order. Craft Patterns are only 15 cents each, or 8½ cents each in the one-dollar packet. Use the full-size Craft Patterns in your '49-'50 classes.

CRAFT PATTERNS • Box 206 • Elmhurst, Ill.

KNOCKDOWN CEDAR CHEST

Write for Free Price List Today

GILES & KENDALL CO., Huntsville, Ala.

Sta-Warm

AUTOMATIC GLUE POTS

• Best for industrial arts. Temperature control is automatic — just plug into the wall outlet.

• No danger of burning the glue nor no danger of burning the pot should it be empty.

1 pint to 11 quarts
Deep or bookbinders style

STA-WARM ELECTRIC CO.—Ravenna, Ohio

TOOLS ALWAYS SHARP with PLURALITY OILSTONE TOOL GRINDERS

No. 450 Plurality Jr.

Now available in 3 sizes
No. 425 Plurality Sub Jr.
No. 450 Plurality Jr.
No. 475 Plurality

Grinding can be done on a cone, coarse or fine oilstone, leather stropping or emery wheels. Unit is compact, efficient, serviceable, easily accessible and has ball bearing direct motor drive. Especially guarded for school shop use. Details on request.

Mummert-Dixon Co. Hanover, Pa.
Originators and Pioneer Manufacturers of Oilstone Tool Grinders

ADVERTISERS' PRODUCTS AND SERVICES

Advertisers in this index are given a code number in addition to the page number on which the advertisement appears. Refer to the advertisement for product or services available. Write direct to advertisers or use the coupon in requesting information from a number of advertisers..

Code No.		Page No.
90	Adjustable Clamp Company	45A
91	American Art Clay Company	46A
92	American Gas Furnace	46A
93	American Steel Foundries, King Machine Tool Div.	7A
94	American Technical Society	36A
95	Ammco Tools, Inc.	5A
96	Armstrong Bros. Tool Co.	4A
97	Atkins and Company, E. C.	10A
98	Atlas Press Company, The	19A
99	Badger American Electrotype Co.	46A
910	Behr-Manning Corporation	29A
911	Bergling, V. C.	46A
912	Black and Decker Mfg. Co.	11A
913	Boice-Crane Company	34A
914	Brodhead-Garrett Company	21A
915	Bruce Publishing Company	35A & 3rd cover
916	Buss Machine Works	8A
917	Carter Div., R. L.	12A
918	Casein Company of America (The Borden Company)	41A
919	Cincinnati Tool Company, The	14A
920	Columbian Vise & Mfg. Co.	38A
921	Craft Patterns	47A
922	Delmar Publishers	35A
923	De Walt Products Corp.	9A
924	Dick Company, A. B.	23A
925	Dietzgen Company, Eugene	2nd cover
926	DonJer Products	43A
927	Driscoll & Co., Martin	46A
928	Eagle Pencil Company	48A
929	Electric Hotpack Company, Inc.	15A
930	Erwood Company, The	14A
931	Foley Manufacturing Co.	8A
932	Foley Lumber Company, T. A.	43A
933	Gearon Company, The	41A
934	General Electric Company	37A
935	General Finishes Sales & Serv. Co.	44A
936	Giles and Kendall Co.	47A
937	Hammett Company, J. L.	46A
938	Harper Electric Furnace Corp.	20A
939	Heuer Publishing Company, The	46A
940	Higgins Ink Co., Inc.	22A
941	Hobbycast Plastics, Inc.	41A
942	Indianhead Archery & Mfg. Co.	44A
943	Kester Solder Company	33A
944	Larson Co., J. C.	44A
945	LeBlond Machine Tool Co., R. K.	4th cover
946	Lewis Machine Tool Co.	45A
947	Lufkin Rule Company, The	4A
948	McKnight and McKnight	45A
949	Macmillan Company, The	28A
950	Manual Arts Press	39A
951	Metal Crafts Supply Co.	45A
952	Metal Goods Corporation	32A
953	Millers Falls Company	30A
954	Morgan Vise Company	8A
955	Mummert-Dixon Company	47A
956	Nicholson File Company	16A
957	North Bros. Mfg. Co.	12A
958	Ohlen Bishop Mfg. Co.	12A
959	Ohmite Manufacturing Co.	42A
960	Oliver Machinery Co.	15A
961	Osborn Bros.	46A
962	Parks Woodworking Machine Co.	14A
963	Paxton Lumber Co., Frank	40A
964	Plastic Parts & Sales	43A
965	Plastic Supply Company	46A
966	Plumb, Inc., Fayette R.	44A
967	Post Company, Frederick	26 & 27A
968	Pratt, G. A.	46A
969	Racine Tool & Machine Co.	4A
970	Red Devil Tools	46A
971	Rockwell Manufacturing Co., Power Tool Div.	13 & 18A
972	Ruby Chemical Company	42A
973	Russo Handicraft Supplies	46A
974	Sheldon & Co., E. H.	31A
975	Sheldon Machine Co., Inc.	25A
976	Sjostrom Co., John E.	38A
977	Skilsaw, Inc.	10A
978	Snap-On Tools, Inc.	6A
979	South Bend Lathe Works	1A
980	Stanley Tools	15A
981	Starrett Co., The L. S.	28A
982	Sta-Warm Electric Company	47A
983	Sterling Tool Products Co.	38A
984	Sterling Wheelbarrow Co.	44A
985	Sunbeam Corporation	6A
986	Testor Chemical Co.	46A
987	Toebe Leather Company, The Chas. A.	46A
988	United States Plywood Corp.	24A
989	D. Van Nostrand Company	32A
990	Walker-Turner Div.	2 & 3A
991	Wallace Company, J. D.	38A
992	F. Weber Company	45A
993	Weldon Laboratory, James W.	46A
994	Western States Envelope Co.	43A
995	Westport Publishing Co.	44A
996	Wisconsin Laboratories, Inc.	46A
997	Woodworkers Tool Works	45A

USE THIS COUPON

The advertisements in this issue have been given a code number for your convenience in requesting information on products, services, booklets, and catalogs offered. Encircle the code number of the advertisement in which you are interested, clip and mail the coupon to INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. Your request will receive prompt attention. BRUCE-MILWAUKEE.

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION 1949
540 North Milwaukee St., Milwaukee 1, Wis.

Please send information offered in the advertisements we have encircled

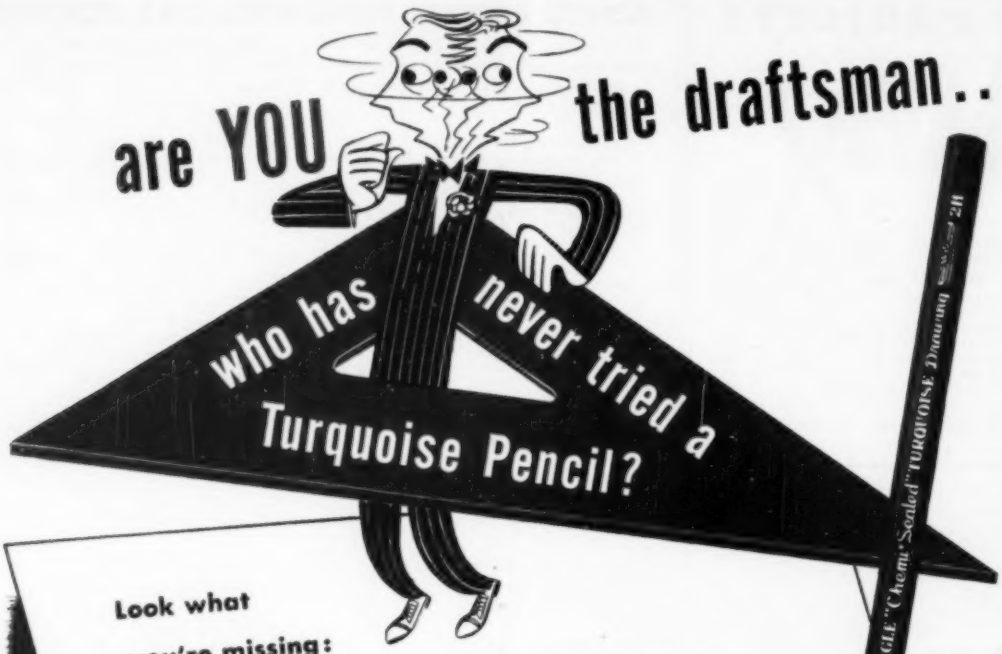
90	911	922	933	944	955	966	977	988
91	912	923	934	945	956	967	978	989
92	913	924	935	946	957	968	979	990
93	914	925	936	947	958	969	980	991
94	915	926	937	948	959	970	981	992
95	916	927	938	949	960	971	982	993
96	917	928	939	950	961	972	983	994
97	918	929	940	951	962	973	984	995
98	919	930	941	952	963	974	985	996
99	920	931	942	953	964	975	986	997
910	921	932	943	954	965	976	987	

Also information on.....

Name.....
Please Print

Title..... School.....

City..... Zone..... State.....



Look what you're missing:

- **STRONG POINTS** that stand up when you bear down
- **SMOOTHNESS** that speeds your work
- **PRECISION GRADING**—6B to 9H—accurately spaced
- **DURABILITY** that saves you time and money
- **OPACITY** for sharp lines and legible blueprints
- **CLEAN ERASURES** that leave no "ghost lines"

FREE TEST SAMPLE

Just write us, name this magazine and your regular pencil dealer, and we will send you a Turquoise Pencil in any grade you specify. Eagle Pencil Co., 703 E. 13 St., New York 9, N. Y.

EAGLE

*"CHEMI-SEALED" SUPER BONDED

TURQUOISE

DRAWING PENCILS AND LEADS

EAGLE PENCIL COMPANY • NEW YORK • LONDON • TORONTO

*Reg. U. S. Pat. Off.

A Good Start this Fall Means Good Texts

Check Your Shop Needs Against this List

[redacted]

ELEMENTARY AND APPLIED WELDING, Groneman and Rigsby
Covers basic information, processes, and projects — gas and electric welding. $2.00

METALWORK ESSENTIALS, Tustison and Kranzusch
Includes the essential bench processes characteristic of the entire field. $2.00

PIPE FITTER'S AND PIPE WELDER'S HANDBOOK, Frankland
Very complete information. $1.25

AIR CONDITIONING METAL LAYOUT, Kaberlein $3.75

SHORT CUTS FOR ROUND LAYOUTS, Kaberlein $3.75

TRIANGULATION SHORT-CUT LAYOUTS, Kaberlein $5.00
Three books covering practical, up-to-date methods in the sheet metal field.

[redacted]

AUTO MECHANICS, Kuns
Five separate paper bound specialized volumes. 1. The Engine; 2. Cooling, Lubrication, and Fuel Systems; 3. Automotive Electricity; 4. The Power Flow; 5. Chassis Units. Each $1.25

AUTOMOTIVE ESSENTIALS, Kuns
Covers the entire car. An ideal beginner's text. $2.32

AUTOMOTIVE SERVICE, Kuns
Covers all repair and maintenance service. Vol. I, $3.50; Vol. II, $3.75
Volume I, units 2, 3, 4 at 80 cents each

[redacted]

SCHOOL-SHOP ADMINISTRATION, Mays and Casberg
Covers all problems in this area. $2.50

250 TEACHING TECHNIQUES, Estabrooke and Karch
Applied to the industrial arts field. $1.75

TEACHING WITH FILMS, Fern and Robbins
How to make best use of instructional films, care for equipment, etc. $2.25

TRADE AND JOB ANALYSIS, Fryklund
Revised and enlarged. How to organize and teach technical subjects and industrial skills in the most efficient manner. $1.75

CONSTRUCTIVE DESIGN, Osburn
An ideal book on "design" for industrial arts teachers. Very inclusive. $5.00

[redacted]

MECHANICAL DRAWING, Books I and II, Revised, Berg
Covers the fundamentals common to all branches of the subject. Sufficient for two years' work. Available in a one- or two-book edition. Features improved methods of teaching, etc.
Paper: Book I, 88 cents; Book II, 80 cents
Complete edition, cloth, $2.56; paper, $1.80

BASIC MECHANICAL DRAWING, Shaeffer
For beginners at the 7th and 8th grade level. 96 cents

ARCHITECTURAL DRAWING, Waffle
For one or two years of architectural drawing in third and fourth years of high school. $2.75

DRAWING FOR LIFE AND INDUSTRY, Green
Approaches the subject through needs for using drawing in all walks of life. $1.56

[redacted]

RURAL ELECTRIFICATION, Revised and Enlarged, Schaenzer
Now up-to-date, for high school vocational agriculture classes. Just recently from the press. $3.75

RURAL ARITHMETIC, Young
Covers arithmetic encountered on the farm. Grouped under natural areas of interest such as crops, livestock, mechanics, etc. Real problems rich in agricultural information. $1.96

FARMER'S SHOP BOOK, Roehl
Shows and tells just how to do all construction, repair work, etc., needed on farms. $3.25

[redacted]

PRINTING FOR THE SCHOOLS, Hague
About equally divided between basic and related information. Perfectly organized for teaching purposes. Profusely illustrated. Includes school newspaper publication, silk screen work, etc. $2.50

[redacted]

PRINCIPLES OF WOODWORKING, Revised, Hjorth
Contains all tools (hand and machine), processes, materials, projects, etc., required for a complete high school course in woodworking. $2.88

BASIC WOODWORKING PROCESSES, Hjorth
Lists, describes, and illustrates the most important hand tool processes that students have to learn. $2.00

OPERATION OF COMMON WOODWORKING MACHINES, Hjorth
A beginner's text on the operation of most-used machines. Paper, $1.72; Cloth, $3.00
Key to OPERATION OF COMMON WOODWORKING MACHINES. $1.00

INSTRUCTIONAL UNITS IN HAND WOODWORK, Brown and Tustison
Covers the entire range of hand tool woodworking operations. Developed on the unit instruction sheet plan. Profusely illustrated. $1.88

[redacted]

FUNDAMENTALS OF APPLIED ELECTRICITY, Jones
A textbook and shop manual especially designed for beginning classes. $2.60

PRACTICAL ELECTRICITY, Crawford
For beginners in vocational and industrial schools. $1.96

FUNDAMENTALS OF ELECTRICITY, Petersen
For students of junior high school age. Developed in the form of separate lessons characterized by simplicity and clearness. 96 cents

[redacted]

SHOP MATHEMATICS, Felker
Basic for the mechanical trades. $2.72

MEASURING INSTRUMENTS, Felker
Gives explanations and uses. 25 cents

APPLIED MATHEMATICS, Johnson
For high school boys going into industry. $1.76

Examination copies sent on 30 days' approval. Write for information on any book or subject not listed.

CATALOG FREE ON REQUEST

THE BRUCE PUBLISHING COMPANY
[redacted]

"turning tips for trainees"

A FEW YEARS AGO LeBlond published a series of helpful hints to apprentice lathe operators. The program was widely acclaimed and requests for it have been received regularly right up to the present time.

ENDEAVORING always to be of service to the vocational instructor, LeBlond is now reviving "Turning Tips for Trainees." It will appear regularly in this space every month during the academic year.

NEXT JUNE a limited number of copies of the entire series will be available at 25c each. To assure yourself of a copy, better reserve one now. The coupon below is for your convenience in ordering.

THE R. K. LeBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO

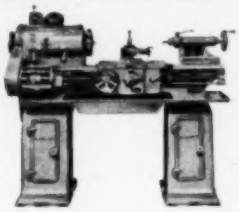
GENTLEMEN: Please reserve ..... copy (copies) of the complete series "Turning Tips for Trainees" at 25c each for delivery during June 1950. I am enclosing $ .....

INSTRUCTOR'S NAME _____
(Please print)

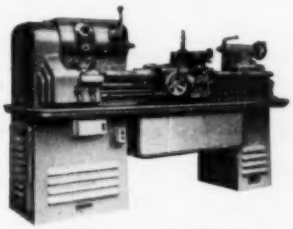
SCHOOL _____

CITY _____ **STATE** _____

POPULAR LATHES IN EVERY SCHOOL SHOP . . .
LeBLOND REGALS AND DUAL DRIVES



REGALS are built in six swing sizes from 13" to 24". The 13" and 15" models – most popular with vocational schools – have 8-speed geared headstock, Rapid Speed Selector, one-piece apron with single lever length and cross feed control, quick change box, and many other plus values. Main drive motor furnished as standard.



DUAL DRIVE . . . a new concept in training lathe design. Combination gear-belt drive headstock delivers speeds in two ranges: 28 to 445 rpm and 540 to 1800 rpm. Furnished with apron controlled electric brake, hardened and ground steel bed ways front and rear, Rapid Speed Selector, enclosed quick change box, one-piece apron, 3-hp main drive motor, and many other advantages you'd expect only in higher priced lathes.

THE R. K. LeBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES
SALES OFFICES: New York, Chicago, Detroit

LeBLOND